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VOLUME V

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NEW YORK

CHICAGO

SAN FRANCISCO

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and of Italian origin, and would seem to have developed naturally from the miracle play of the Middle Ages, the first operas dating from the sixteenth century. About the close of this century the poet Rinuccini wrote a drama on the classical story of Daphne, which was set to music by Peri, the most celebrated musician of the age. The orchestra of this first opera consisted of four instruments, namely, a harpsichord, a harp, a viol di gamba, and a lute. There was no attempt at airs, and the recitative was merely a kind of measured intonation. Monteverde, a Milanese musician, improved the recitative by giving it more flow and expression; he set the opera of *Ariadne*, by Rinuccini, for the court of Mantua; and in the opera of *Giasone* (Jason), set by Cavalli and Cicognini, for the Venetians (1649), occur the first *airs* connected in sentiment and spirit with the dialogue. The first regular serious opera was performed at Naples in 1615, and was entitled *Amor non ha Legge*. The first *opera buffa* is said to have been represented at Venice in 1624, where also the first stage for operas was erected in 1637. In 1646 the opera was transplanted to France by Cardinal Mazarin, about the same time to Germany, and somewhat later to England. In France there arose Lulli; in Germany, Keiser; in Italy, Scarlatti; and in England, Purcell, who are the chief operatic composers of the second half of the seventeenth century. The chief Italian operatic composers include, besides those already mentioned, Piccini, Jomelli, Cimarosa, Paisiello, in the last century, and Cherubini, Rossini, Bellini, Donizetti, Verdi, etc., in the present. Among the French composers are Grétry, Monsigny, Rousseau, Méhul, belonging to the eighteenth century, Boieldieu, Auber, Halévy, Herold, A. Thomas, and Gounod to the nineteenth. The chief recent composers of French comic operas are Offenbach, Lecoq, Hervé, and Bizet. Among American composers of operas may be mentioned Reginald de Koven, Damrosch, Sousa, Fry; and of English composers of the present or recent times Balfe, Wallace, Macfarren, Sullivan, Mackenzie, Thomas, and Stanford. It is the German composers, however, who have raised opera to the highest pitch of perfection, the list including such names as Handel, Gluck, and Mozart in the last century, Beethoven, Weber, Flotow, etc., in the present. Meyerbeer, though German by birth, is to be classed rather with the modern French composers. In the most recent school of German operatic composition, at the head of which stands Richard Wagner, the vocal music of the piece is deprived of the prominent place formerly assigned to it, and is made subordinate to the other three elements—text, instrumentation, and scenic decoration.

**Opéra Bouffe** (buf), a farcical form of *opera buffa* in which the characters, subject matter, and music is intended to burlesque the more serious style of opera. Offenbach was the creator as well as the chief master in this art. The comic operas of Gilbert and Sullivan, both in the character of the music and the libretti, stand by themselves.

**Ophicleide** (of'i-klid), a brass wind instrument of music invented to supersede the serpent in the orchestra and in military bands. It generally consists of a wide conical tube, terminating in a bell like that of a horn, with a mouthpiece and ten holes or ventages which are stopped by keys. Ophicleides are of two kinds, the bass and the alto; the former has a compass of three octaves and one note, ranging from B on the third space below the bass staff to C on the third space of the treble staff, including all the intermediate semitones. The alto ophicleide (an inferior instrument) has the same extent of compass but starts an octave higher.

**O'phir**, a country or city to which the Hebrews made voyages in the time of Solomon, bringing home gold, almug wood, and precious stones. Some identify it with the Ophir mentioned in the Bible, which was apparently situated in Arabia; while others place it in India, or in Africa.

**Oph'ite**, green porphyry or serpentine, a metamorphic rock of a dusky-green color of different shades, sprinkled with spots of a lighter green. It is a hydrous silicate of magnesia with alumina and iron. Called also *Ophiolite*.

**Ophthalmoscope**, an instrument for observing the internal structure of the eye. It consists of a mirror (plane in that of Coccus, concave in that of Desmarres), by which light from an artificial source is directed into the eye of the patient, and a double convex lens by which the illumined parts of the structure of the eye are magnified in order that they may be more easily examined, the observer looking through a hole in the center of the mirror. The light is usually placed to the side of and slightly behind the patient's head.

**Opinion of Counsel**, the advice given by a barrister or advocate in answer to questions put with regard to a "case" or "memorial" prepared by an attorney or solicitor.

**Opitz** (or Opatius) MARTIN (1597-1639), German poet. He studied at Frankfort-on-the-Oder and at Heidelberg, and having afterward visited Holland he went in 1621 to the court of the Duke of Liegnitz, whence in about a year he removed to become professor of philosophy and classical literature at the University of Weissenburg (now Karlstadt). Becoming distinguished for his talents, he went in 1625 to Vienna, where the Emperor Ferdinand II bestowed on him the poetical crown and letters of nobility, when he assumed the title of Von Boberfeld. Among his works are a poem on *Mount Vesuvius*, *Silva*, *Epigrams*, etc.; but he is more important for the influence of his teaching regarding correctness in poetic style than for his own poems.

**Opium**, the inspissated juice of a species of poppy, cultivated on a large scale principally in Hindustan and in Asiatic Turkey, but well known in many places as a garden plant, being an annual with white, red, or violet flowers and glaucous leaves. The opium is the juice that flows from incisions made in the green heads or seed capsules after the fall or removal



## Oporto

of the petals, and the best of the plant flows from the first incision. The juice is at first a milky liquid, but soon solidifies and turns black, and is then scraped off and collected. It is one of the most energetic of narcotics, and at the same time one of the most precious of all medicines, and is employed in a great variety of cases, but most commonly for the purpose of procuring sleep and relief from pain. In medicine it is very commonly used in the form of *laudanum*, which is a simple tincture or extract in spirits of wine; it is also an ingredient in various *patent* and other remedies. Another opium preparation is *morphine* (which see). In its natural state opium is heavy, of a dense texture, of a brownish-yellow color, not perfectly dry, but easily receiving an impression from the finger; it has a faint smell, and its taste is bitter and acrid. The chief active principle of opium is *morphia*, or morphine in combination with meconic acid. The principal part of our supply of opium is brought from Turkey, whence it is imported in flat pieces or cakes, covered with leaves. In the case of many temperaments opium produces such agreeable effects, whether a delightful dreamy calm, a state of pleasant exhilaration, or beatific visions, that numbers of persons are led to use it habitually, as others use alcohol in some form, though over-indulgence in it is attended with at least as evil effects as over-indulgence in the latter. But like tobacco it is taken by vast numbers without any apparent result one way or other. Some habitual takers of opium can take as much in a day as would kill ten or twenty persons unaccustomed to it. It is taken in two ways, known as opium-eating and opium-smoking. The habitual use of opium is most common in China, the southeast of Asia, and the Malay Archipelago, where it is chiefly smoked in a special pipe. The pipe, or rather the stem of the pipe, is about the length and size of an ordinary flute; the bowl is generally made of earthenware. The smoker, who is always lying, or at least reclining, takes a small portion of opium about the size of a pea on the end of a spoon-headed needle, heats it at a lamp, and then places it in the bowl of the pipe, the pellet of opium having previously been perforated with the needle. He then brings the opium to the flame of the lamp, inhales the smoke in several inspirations, and is then ready to repeat the process with a fresh quantity of opium until the desired intoxication ensues. Large quantities of opium are consumed in China, a great part of which comes from India, though probably as much or more is also produced in China itself. The Indian opium, however, is preferred to their own by the best judges among the Chinese.

**Opor'to** (Portuguese, *O Porto*, the port), a large city and seaport of Portugal, the second in the kingdom, capital of the province of Entre Douro e Minho, on a steep declivity on the right bank and about 2 mi. from the mouth of the Douro, 170 mi. n. of Lisbon. The river is crossed by two iron bridges of recent construction, one of them, the railway bridge, especially bold and striking. Among the

## Opplan

chief buildings are the Gothic cathedral, the church of S. Francisco (Gothic), the bishop's palace, an enormous building, the exchange, and the Torre dos Clerigos, a granite tower 210 ft. high. There are also museums, a large library, medical college, Crystal Palace, and fine garden, etc. The principal trade is in wine, white and red, but chiefly the latter (*port* wine, so named from this town). There are some manufactories of hats, silks, cotton, woolen, and linen stuffs, pottery, lace, glass, leather, and paper, etc. Oporto was at one time the capital of Portugal. In 1809 Wellington drove the French out of it after the remarkable passage of the Douro. Pop. 105,838.

**Opos'sum**, the name of several species of *Didelphys*, a genus of mammals, having four hands and a long prehensile tail. They are nocturnal animals, living constantly on trees, and there pursuing birds, insects, etc., although they do not despise fruit. The females of certain species have an abdominal pouch in which are the mammæ, and in which they can enclose their young. The best-known species of opossum is the *Didelphys virginiana*,



Virginian Opossum.

very common in the U. S. It is almost the size of a large cat, the general color whitish gray, and the whole hair of a wool-like softness. On the ground the motions of the opossum are awkward and clumsy, but on the branches of a tree it moves with great celerity and ease, using the prehensile tail to assist its motions. When caught or threatened with danger the opossum counterfeits death, and "playing 'possum" has on this account passed into a proverb as used to indicate any deceitful proceeding. The female has from ten to fifteen young, which are for a long time nourished in the pouch, to which they resort when alarmed.

**Oppenheim** (-hīm), an old town of Germany, in Hesse, on the left bank of the Rhine, 12 mi. s. of Mainz, on the slope of a hill abounding in vineyards, a place of considerable historical importance in the Thirty Years' War and later. Pop. 3,452.

**Opplan**, the name of two Greek authors, one of whom wrote a poem entitled *Haliœutica* (Fishing), and the other a poem on *Cynegetica*

(Hunting). The author of the *Halieutica* flourished about 170 A.D. His poem consists of about 3,500 lines, divided into five books. The author of the *Cynegetica* was b. at Apamea or Pella, in Syria, and flourished about 210 A.D. His work, which was dedicated to the Emperor Caracalla, is composed of four books containing 2,100 hexameter lines. There is also a prose paraphrase of a poem on *Hawking*, attributed to Oppian; but it is doubtful to which of the two it belongs.

**Ops**, the Roman female divinity of plenty and fertility. She was regarded as the wife of Saturn, and, accordingly, as the protectress of everything connected with agriculture.

**Optics** is the branch of physics which treats of the transmission of light, and its action in connection with the laws of reflection and refraction, including also the phenomena of vision. A ray of light is the smallest conceivable portion of light, and is represented by the straight line along which it is propagated. A pencil of light is a collection of such rays; it is parallel when all the component rays are parallel to each other; converging when they all proceed to a single point; and diverging when they all proceed from a single point. The focus of the pencil is the point to or from which the rays proceed. Any space or substance which light can traverse is in optics called "a medium." When light falls on any surface a certain portion of it is reflected or sent back, and it is owing to this reflected light that objects are visible. When light falls upon the surface of a solid substance or medium that it can traverse (a transparent substance), one portion greater or less is directed or reflected back into the medium whence it came; another portion is transmitted through the solid medium, but undergoes a change called refraction; while a third portion is absorbed in the new medium. When all the minute parts of a surface give out rays of light in all directions we call it a luminous surface, whether it is self-luminous or is merely reflecting the light from a self-luminous body such as the sun. The law of reflection is that the angle of incidence and that of reflection are in the same plane, and that the angle of reflection is equal to the angle of incidence, and on the opposite side of the perpendicular. This law holds true whatever be the nature of the reflecting surface or the origin of the light which falls upon it. The law of refraction comes into operation when a ray of light passes through a smooth surface bounding two media not homogeneous, such as air and water, or when rays traverse a medium, the density of which is not uniform, as the atmosphere. When the ray of light passes from a rarer into a denser medium, it is bent or refracted toward the perpendicular line drawn through the point of incidence, or the angle of refraction is less than the angle of incidence. On the contrary, when a ray of light passes from a denser into a rarer medium the refraction is from the perpendicular, or the angle of refraction is greater than the angle of incidence.

The law of reflection is illustrated especially

by the action of mirrors. When a pencil of rays from a luminous point falls on a plane mirror each ray is reflected according to the law given above, and it is easy to show by geometry that the pencil which was divergent before incidence has exactly the same divergence after reflection; but the rays now seem to have proceeded from a point behind the mirror. This point is called the "virtual image" of the first point (being not a real image of it); the line joining the points is at right angles to and is bisected by the mirror. Now a luminous object is made up of points, each of which sends a divergent pencil to the mirror, which seems after reflection to proceed from a point behind the mirror, and hence a luminous object sends rays to a plane mirror which after reflection seem to have proceeded from a luminous object behind the mirror. An eye receiving a ray (or a small pencil of rays) gets the impression that the luminous point from which it was sent is somewhere in the line of the ray just before reaching the eye, and hence an eye in such a position as to receive after reflection a few rays from every point of the object sees the image of the object. Besides plane mirrors concave and convex mirrors are often used in optics. When a mirror is not plane the incident rays from a luminous point in general neither converge to a single point after reflection nor diverge as if they had come from a virtual image. But when a concave mirror forming a small portion of a spherical surface is used we find that all the rays falling upon it from a luminous point converge so nearly to a luminous point after reflection that their "aberration" (as the non-convergence of the rays is called) may be neglected in practise. The line joining the center of the spherical surface with the "pole" of the mirror (that is, the middle point of the reflecting surface) is called the principal axis. Any bundle of rays parallel to the principal axis converges after reflection to a point in the axis called the principal focus; and any bundle of parallel rays converges after reflection to a focus which is at the same distance from the mirror as the principal focal distance. When the object from which the rays proceed is at a considerable distance, an inverted image of it will be formed midway between the center of curvature and the mirror. When the object is only at a moderate distance, but exceeding half the radius of curvature, an inverted image is still formed in front of the mirror, being diminished when nearer the mirror than the object is, and magnified when farther away than the object. The image of an object placed nearer a concave mirror than the principal focus is erect and larger than the object and is virtual. The image of any object in a convex mirror is also virtual and erect; it is, however, smaller than the object.

When the two faces of a piece of glass through which light is refracted are both of them plane, it is called a plate if they are parallel, and a prism if they are not parallel. When the faces are curved, or one of them



## Optimism

curved and the other plane, it is called a *lens*. Prisms are the essential parts of the apparatus used for decomposing light and examining the properties of its component parts, as in spectrum analysis. See *Light*. A lens may be regarded as consisting of an unlimited number of prisms, the angles between their faces gradually diminishing the farther away from the axis of the lens. It is the property of convex lenses to diminish the divergency of the pencils of light, of concave lenses to increase that divergency. It is the duty of a convex lens to make rays parallel to the axis falling on one face of it converge accurately to one point after emerging from the other face. This point is called the principal focus, and is the point where a "real" image would be formed. When rays parallel to the axis pass through a concave lens they diverge, and if produced backward in the direction from which they come they would meet at one point, which in this case also is called the principal focus; but it is only a virtual focus, because the rays themselves do not pass through it, but only their backward productions. Thus concave lenses bend rays from the axis, and convex ones bend them toward it. When we look through a concave lens it makes objects seem smaller whatever their distances are. When we look through a convex lens at an object between the lens and the principal focus it appears larger than it really is, and hence the use of such lenses in magnifying glasses, microscopes, and telescopes. *Convex* lenses are used in spectacles for long-sighted (or *old-sighted*) persons, because the lens of their eye is too much flattened, and does not of itself cause a sufficient convergency of the rays to make an image on the retina, but one that would fall behind it. *Concave* lenses, again, are used by near-sighted persons, because the rays in their case converge so much as to make an image in front of their retina instead of on it.

**Optimism**, that philosophical doctrine which maintains that this world, in spite of its apparent imperfections, is the best possible. It is an ancient doctrine; among modern philosophers Leibnitz is its principal advocate.

**Or**, in heraldry, the tincture that represents gold. See *Heraldry*.

**Orach** (Orache) (or'ach), is the popular name of several plants with mealy foliage, generally growing near the sea. A cultivated species is known as garden or mountain spinach, being used like spinach.

**Oracles**, the answers which the gods of the Greeks, Romans, Egyptians, etc., were supposed to give, by words uttered or otherwise, to those who consulted them upon any occasion; also the places or sources whence these answers were received. The credit of oracles was so great that vast numbers flocked to them for advice. Scarcely any war was waged, or peace concluded, or new form of government instituted, or new laws enacted, without the advice and approbation of some oracle. The Greek oracles were the most celebrated, the earliest being that of Zeus (Jupiter) at Do-

## Orang

dona. Of other gods Apollo had many oracles, but that at Delphi held the first place, and it was often applied to for explaining obscure answers obtained at Dodona. Another famous oracle of Apollo was in the island of Delos. The Romans had no important oracles of their own, but had recourse to those of Greece and Egypt. They long maintained their standing, and sunk only with the freedom and independence of Greece. Under the reign of Theodosius the temples of the prophetic deities were closed or demolished.

**Oran'**, a seaport of Algeria, capital of province of same name. The town rises in the form of an amphitheater, has now largely a European character, and is strongly fortified. The harbor was formerly at Mers-el-Kebir, about 5 mi. n.w. of the town, but recently excellent accommodation for shipping has been provided at Oran itself. Oran has a large trade. Chief exports: cereals, esparto and alfa grass, wine, olives, etc. Pop. 67,681, of whom about three fourths are Europeans.

**Orang'** (or Orang-outang), a mammal, one of the anthropoid or man-like apes or monkeys. This animal seems to be confined to Borneo, Sumatra, and Malacca. It is one of those animals



Orang-outang.

which approach most nearly to man, being in this respect only inferior to the chimpanzee and gorilla. It is utterly incapable of walking in a perfectly erect posture. Its body is covered with coarse hair of a brownish-red color; in some places on its back it is 6 in. long, and on its arms 5 in. The face is destitute of hair save at the sides. It attains a height of from 4 to 5 ft., measured in a straight line from the vertex to the heel. The arms reach to the ankle joint. The hind legs are short and stunted, the nails of the fingers and toes flattened. They swing themselves along from tree to tree by the aid of their long arms, but

## Orange

their gait on the ground is awkward and unsteady. At birth the head of the orang resembles that of a young child. These apes are remarkable for strength and intelligence, and are capable of being highly domesticated if captured young. They feed chiefly on fruits and sleep on trees. See also *Man, Apes, Monkeys*.

**Orange**, the fruit of the *Citrus Aurantium*, and the shrub or tree itself. The orange is indigenous in China, India, and other Asiatic countries, and was first introduced in Portugal about 1520. It is extensively cultivated in the U. S., especially in Florida and California. Large quantities are also produced in the Azores, in Africa, and the West Indies, in Australia, and the Pacific Islands. The tree is a middle-sized evergreen, with a greenish-brown bark.



Sweet Orange, Branch and Flower.  
—a.—fruit; b.—transverse section  
of same. (Bentley and Trimen.)

The flowers are white. The fruit is globose, bright yellow, and contains a pulp which consists of a collection of oblong vesicles filled with a sugary and refreshing juice; it is divided into eight or ten compartments, each usually containing several seeds. The principal varieties are the common sweet, or China orange, the bitter or Seville, the Maltese, or red pulped, the Tangerine, the Mandarin, or clove, and the St. Michael's. The leaves, flowers, and rind yield fragrant oils much used in perfumery, and for flavoring essences. The wood is fine grained, compact, susceptible of a high polish, and is employed in the arts. The citron and lemon are allied fruits.

**Orange**, a small and ancient principality in Southeastern France, which from the eleventh to the sixteenth century had its own princes. By the peace of Utrecht (1713), it was ceded to France. The reigning dynasty of the Netherlands is of the house of Orange, and the heir apparent bears the title of Prince of Orange.

**Orange**, Essex co., N. J., 12 mi. w. of N. Y. Railroads: Erie, and D. L. & W. Industries include the manufacture of hats and carriages. Pop. 1900, 24,141.

**Orange Free State**, now the Orange River Colony. It has Cape Colony on s. and s. w., Bechuanaland on n. w., Transvaal on n., Natal on e., Basutoland on s. e.; area est. at 70,000 sq. mi., divided into several districts; pop. 150,000, of whom about 60,000 are whites. It was founded in 1835-36 by Dutch settlers from

## Oratorio

Cape Colony, annexed by Britain in 1848 in order to put a stop to the Boer outrages upon natives; but in 1854 it was recognized as an independent state. Lying about 5,000 ft. above the sea level, the country, chiefly vast undulating plains, is cold in winter, with violent thunderstorms and long droughts in summer. It is, however, very healthy, and favorable to European constitutions. Pasturing is the chief occupation, and wool, hides, and ostrich feathers the principal exports. Diamonds and other precious stones have been found in paying quantities, rich coal-mines exist, and the state is said to abound in other mineral wealth. Gold was discovered in 1887. The executive was vested in a president and a council; the legislative functions in the Volksraad, an assembly of fifty-six members, elected by universal suffrage. The Dutch Reformed Church is the dominant religion, and a Dutch dialect the language of the country. Capital, Bloemfontein, pop. 3,270. It was annexed to the British Empire in 1900. See *Transvaal*.

**Orange Lily**, a species of lily having a scaly bulb, a leafy stem 2½ ft. high, small dark-brown bulbs in the axils of the leaves, and large orange-colored flowers.

**Orangemen**, the members of a secret society founded in the north of Ireland in 1795, to uphold the Protestant religion and political ascendancy, and to oppose the Catholic religion and influence and their secret societies. The title of the association was adopted in honor of William III of England, prince of Orange. The head of the association is the Imperial Grand Lodge with its imperial grand master; then there are grand lodges, grand county lodges, district and subordinate lodges, spread over Ireland, Great Britain, some of the colonies, especially Canada, and also the U. S., but the chief strength is in the north of Ireland. In 1835 the society was dissolved in consequence of intrigues in the army, but revived in 1845. Great demonstrations take place annually on July 12, the anniversary of the battle of the Boyne, and where the Catholic and Protestant parties are both in considerable strength the processions of either party are the cause of serious disturbances.

**Orange River** (or Gariep), a river in South Africa, forming part of the north boundary of Cape Colony, and falling after a total course of about 650 mi. into the Atlantic. It is formed by the junction of the Ky Gariep, or Vaal River, with the Nu Gariep, Black or Cradock River, both of which have their sources in the Drakensberg or Quathlambu Mountains, near the same locality. Its volume varies greatly, and it is of no use for navigation.

**Oratorio** (Italian, *oratorio*, a small chapel, the place where these compositions were first performed), a sacred musical composition consisting of airs, recitatives, duets, trios, quartettes, choruses, etc., with full orchestral and sometimes organ accompaniment, the subjects being generally taken from Scripture. Its origin has been usually ascribed to St. Filippo de Neri, who, in 1540, founded the congregation of the Oratory in Rome, one of the objects of



## Orcagna

which was to render religious services as attractive as possible. Its increasing popularity induced poets of eminence to supply texts for these works, and Metastasio wrote a number of oratorios. Among the most notable productions are the *Messiah* and *Israel in Egypt*, by Handel; the *Creation*, by Haydn; the *Mount of Olives*, by Beethoven; the *Last Judgment*, by Spohr; *Saint Paul* and *Elijah*, by Mendelssohn. Among the oratorios by living composers are *Saint Peter*, by John Knowles Paine; *The Light of the World* and *The Prodigal Son*, by Sir Arthur Sullivan; *The Rose of Sharon*, by A. C. Mackenzie; *The Deluge* and *Ruth*, by F. H. Cowen.

**Orcagna**, (or-kân'yâ), ANDREA DI CIONE (1308-1386), one of the greatest of the early Florentine artists after Giotto. Painting, sculpture, architecture, and mosaic work were all within the sphere of his artistic genius; and his productions compare favorably with the best of a period so rich and distinguished in the art of Italy. As a painter he executed the beautiful frescoes in the church S. Maria Norella at Florence; the chapel San Michele and its magnificent tabernacle in the same city are grand memorials of his architectural and sculptural talent. His style is remarkable for exquisite design, graceful pose, and delicate execution. Boccaccio has perpetuated his name in his *Decamerone*.

**Orchard**, an inclosure devoted to the culture of fruit trees, especially the apple, the pear, the plum, the peach, and the cherry. The most suitable position for an orchard is a declivity lying well exposed to the sun and sheltered from the colder winds, but yet not too much shut in. The soil should vary according to the kind of fruit cultivated, and it is generally allowed to produce only grass besides the fruit trees. Fruit cultivation is carried on most extensively on the continent of Europe and the U. S.; but in Great Britain the area of orchards is comparatively limited, although the flavor of the fruit produced is of the very best. The chief fruit-growing states are New York, Ohio, Michigan, Illinois, Pennsylvania, Delaware, New Jersey, Maryland, Indiana, and California. The largest orchard in the world is in Santa Barbara, California. It extends to 1,700 acres, and contains 10,000 olive trees, 3,000 English walnut trees, 4,500 Japanese persimmon trees, 10,000 almond trees, and about 4,000 other fruit and nut trees. This orchard is said to bring the owner an income of not less than \$750 per acre.

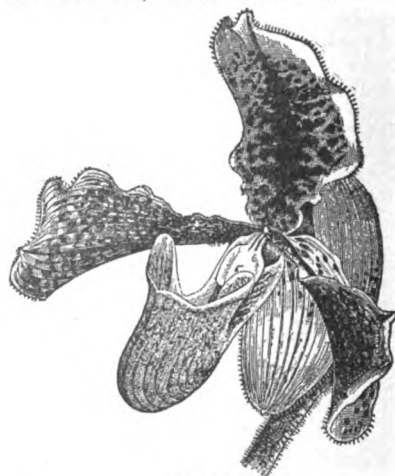
**Orchardson**, WILLIAM QUILLER, R. A., subject painter, b. in Edinburgh 1835. He painted portraits and exhibited in the R. S. A. till 1863, when he removed to London. He became an associate of the Royal Academy in 1868, and full academician in 1879. He is among the first of British incident painters, a fine colorist, and most of his works are skillfully dramatic and picturesque. Among his more notable pictures are *The Challenge*, *Christopher Sly*, *The Queen of the Swords*, *Napoleon on Board the Bellerophon*, *Un Mariage de Convenience*, *Salon of Mme. Recamier*, *The First Cloud*, and *The Young Duke*.

## Orchids

**Orchella** (or-kel'â), name of several species of *Rocella*, a genus of lichens, originally brought from the Levant, and employed from very early times as a dye agent. Large quantities are gathered in the maritime rocks of the Canary and Cape Verd Islands. A purple and a red dye, known as orchil or archil, are prepared from them.

**Orchestra** (or'kes-tra), the space in theaters between the seats occupied by the spectators and the stage, appropriated by the Greeks to the chorus and the musicians, by the Romans to the senators, and in our modern theaters to the musicians. The name is also used for the part of the concert rooms assigned to the vocal and instrumental performers; and, finally, is applied to the instrumental performers, collectively taken. A modern orchestra in the last sense consists of stringed, wind, and percussion instruments, in varied proportions, according to the number of instrumentalists.

**Orchids** (or Orchidaceæ) (or-ki-dâ'sē-ā), an extensive order of endogens (nearly 2,000 species being known), consisting of herbaceous plants or shrubs, with fibrous or tuberous



Orchid.

roots, and showy flowers. They are natives of all countries, but very cold and dry climates produce but few species; some of them grow in the ground, but a large number are epiphytes, growing upon trees; and it is above all in the great virgin forests of South America and of the East Indies that the orchids abound. The orchids attract much attention, and are cultivated with zeal on account of the beauty or curious shapes of the flowers (which often assume the forms of reptiles, insects, and other denizens of the animal kingdom), or for their, not infrequently, fragrant smells. The cultivation of orchids has of recent years become a sort of mania, large sums being often paid for new or rare varieties. The nutritive substance called salep is prepared from the roots and tubers of several species; the fragrant vanilla is obtained from two species of a genus of that name. See colored plate, Flowers.

## Orcin

**Orcin** (or Orcine), a peculiar coloring matter obtained from orchella. When exposed to air charged with vapors of ammonia it assumes by degrees a fine violet color; when dissolved in ammonia it acquires a deep blood-red color.

**Ordeal**, an ancient form of trial to determine guilt or innocence, practised by the rude nations of Europe, in the East, and by the savage tribes of Africa. There were two principal kinds of ordeal, *fire ordeal* and *water ordeal*; the former being confined to persons of higher rank, the latter to the common people. Both might be performed by deputy, but the principal was to answer for the success of the trial. Fire ordeal was performed either by taking in the hand a piece of red-hot iron, or by walking barefoot and blindfold over glowing coals, or over nine red-hot plowshares laid lengthwise at unequal distances; and if the person escaped unhurt, he was adjudged innocent, otherwise he was condemned as guilty. Water ordeal was performed either by plunging the bare arm to the elbow in boiling water, escape from injury being considered proof of innocence; or by casting the person suspected into a river or pond, and if he floated without an effort to swim it was an evidence of guilt, but if he sunk he was acquitted. As success or failure, except in a few cases, depended on those who made the requisite preparations, a wide field was opened to deceit and malice. Besides these ordeals there were a variety of others practised in many countries, such as the corsned or hallowed morsel trial, the trial by touching the dead body of a person murdered, which was supposed to bleed if touched by the murderer, the ordeal by swallowing certain herbs and roots, etc. After the fourteenth century ordeals became more and more uncommon. In the sixteenth century only the trial of the bier was used, and this continued even into the first part of the eighteenth. In consequence of the prevalent belief in sorcery or witchcraft the ordeal by cold water was long retained in the trials of witches. These foolish customs were gradually done away, but isolated cases in some of the benighted countries of Europe happened until a comparatively recent period. Ordeals are still found in many nations out of Europe, as in West Africa and other parts of that continent. In Madagascar till lately trial by ordeal (swallowing the poison of the tree *Tanghinia venenosa*) was in regular use. The Chinese still retain the ordeal of fire and water, and various ordeals are practised among the Hindus.

**Ordeal Root**, the root of a species of plant of the genus *Strychnos*, used as an ordeal in West Africa.

**Orderlies**, in the U. S. army, are privates and non-commissioned officers selected to attend upon general and other officers, for the purpose of bearing their orders and rendering other services. The *orderly officer*, or officer of the day, is the officer of a corps or regiment, whose duty is to superintend its interior economy, as cleanliness, quality of the food, etc. An *orderly book* is provided by the cap-

## Oregon

tain of each company or troop, in which the general or regimental orders are entered.

**Order of the Day**, in legislative language, is a bill or other matter which the House has ordered to be discussed on a particular day.

**Orders, MILITARY**, fraternities, or societies of men banded together in former times for military and partly for patriotic or Christian purposes. Free birth and an irreproachable life were the conditions of admission. The chief were the Templars, the Teutonic Knights, and the order of St. John of Jerusalem.

**Orders, RELIGIOUS**. See *Monasteries* and *Monachism*.

**Ordinary**, in common law, one who has ordinary or immediate jurisdiction, in matters ecclesiastical, in any place. As a nautical term an *ordinary* seaman is one not qualified to take the helm or sail the ship, and is thus distinguished from an *able* seaman.

**Ordnance**. See *Cannon*, *Artillery*, *Howitzer*, *Mortar*, etc.

**Ordnance Department**, in the U. S. the Department of Ordnance is attached to the War Department, and has a Chief of Ordnance, with a large force of officers and clerks at an annual cost in salaries of \$175,000.

**Ore**, the compound of a metal and some other substance, as oxygen, sulphur, or carbon (forming oxides, sulphides, carbonates, etc.), by which its distinctive properties are disguised or lost. Metals found free from such combination and exhibiting their natural character are called *native*. Metals are commonly obtained from their ores by smelting, the ores having been previously oxidized by *roasting*. Ores are commonly found in veins or lodes. See *Mining*.

**Oregon**, the *Beaver State*, one of the Pacific states, is bounded on the n. by Washington, on the e. by Idaho, on the s. by Nevada and California and on the w. by the Pacific Ocean. Its average length from e. to w. is 345 m., the average width from n. to s., 276 m., and the total area, 97,030 sq. m. In 1900, the population was 413,536, of which 10,397 are Chinese and 4,957 Indians.

**Surface**.—The surface of Oregon is considerably broken. There are two great mountain chains: the Coast Range, running from n. to s. not far from the coast, and, about 70 m. to the e.; and the Cascade Range, surmounted by snow-capped peaks reaching an altitude of 15,000 ft. Between these ranges lie fertile valleys and plateau lands, and eastward from the Cascades extend vast wheat and pasture areas for a distance of over 200 m. The principal rivers are the Columbia and Willamette.

**Climate**.—The mildness of the climate is due in part to the warm winds which blow inland from the ocean during the winter months. The range of temperature from summer to winter is small. On the coast, especially, is this true. Here the summers are foggy and the winters are unusually rainy because of the moisture precipitated by the warm ocean winds breaking against the Coast Range. In the valleys between the two ranges there is

considerably less, though abundant, rainfall. The summers are pleasant, the winters wet. In eastern Oregon the rainfall is less than half of that in the western valleys, the summer heat is greater, the temperature in winter is at times below zero, and the snowfall is considerable.

**Mining.**—As in the other states of the northwest, the mineral resources of Oregon are rich and varied. In eastern Oregon are especially valuable gold fields. Borax, iron ore, copper and nickel are other important mineral products. In 1900 the yield of gold valued \$3,770,000; of silver, \$15,000; and of coal, \$270,000.

**Agriculture.**—The slopes of the Coast Range and of the Cascades are heavily wooded. The valley region of western Oregon produces a quantity and quality of fruit not often equalled. The eastern portion of the state is remarkable for its great wheat production. As a hop-growing state, Oregon ranks among the first. Although the number of herds is diminishing, the raising of live-stock is of the first importance. The value of the wool clip for 1900 was \$2,500,000, and of the sales of stock, \$10,500,000. Dairying, especially in the coast regions, is a profitable industry. During 1900, the cheese, milk and butter products were valued at \$5,113,013.

**Fisheries.**—Fishing is another of Oregon's leading industries, the value of the fish caught and packed during 1900 being \$2,212,307.

**Manufactures.**—The principal manufactures include flouring and grist mill products, lumber and timber products, furniture, car construction and railway repairs, and foundry and machine-shop products. The total value of the manufactures for 1900 was \$46,000,537.

**Transportation.**—Oregon has a railway mileage of nearly 2,000. The principal systems are the Southern Pacific, Oregon Pacific and Oregon Railway and Navigation Co. Steamers ply on the Columbia and Willamette, and for short distances on some of their tributaries. Around the Cascades, the state has built a portage railway, and the U. S. government has built a canal and locks costing over \$2,000,000. The Willamette river is obstructed at Oregon City by falls 41 ft. high, around which a canal and locks have been constructed by the state.

**Education.**—The leading educational institutions are the State University at Eugene, the State Agricultural College at Corvallis, and the state normal schools at Monmouth, Weston, Ashland and Drain. The common school system is carefully organized. The sum of \$1,728,224 was, during 1900, devoted to its maintenance. Among the many denominational institutions, Willamette University at Salem is prominent. The State Reform School, Oregon Institute for the Blind and State Insane Asylum are at Salem.

**History.**—Drake discovered the coast of Oregon in 1579, and two centuries later, 1792, Vancouver surveyed the entire coast and ascended the Columbia river. Astoria was established in 1811, by John Jacob Astor; two years later

it was sold to the Northwestern Fur Company and afterwards passed into the hands of the Hudson Bay Company. In 1832, settlement by New Englanders began, and in 1848 Oregon became a territory. Eleven years later admission into the Union was granted and the boundaries were somewhat reduced. Oregon has always enjoyed exceptional prosperity. The principal cities, with their population in 1900, are: Salem, the capital, 4,258; Portland, the largest city, 90,426; Astoria, 8,381; Baker City, 6,663, and Oregon City, 3,494.

**Orel** (Russian pron. ár-yol'), a central government of Russia, s. of the Tula and Kaluga; area 18,042 sq. mi. Its surface, though flat, is elevated, and the soil raises grain and hemp in abundance, and some good hops and tobacco. Live-stock, particularly horses, are extensively reared from improved breeds. Manufactures are chiefly confined to the distillation of spirits. The principal rivers are the Oka, the Desna, and the Sosna. Orel, or Orlov, the capital, on the Oka, is an important business center, the rivers and canals giving it water communication with the Black Sea, the Caspian, and the Baltic. Its trade in grain, dairy produce, and cattle with Moscow and St. Petersburg is very extensive. Manufactures are also increasing, and the town is making rapid progress. Pop. 78,091. Pop. of government 1,963,706.

**Ores'tes**, in Greek mythology, the son of Agamemnon and of Clytemnestra, the avenger of his father, by becoming the murderer of his mother. For this murder he is relentlessly pursued by the Eumenides or Furies, and only succeeds in appeasing these terrible goddesses by carrying out the instructions of the Delphian oracle to bring back the statue of Diana from Tauris to Argos. Married to Hermione, daughter of Menelaus, Orestes ruled over his paternal kingdom of Mycenæ, and over Argos, upon the death of its king. Orestes is an important figure in the *Choëphori* and the *Eumenides* of Æschylus, the *Electra* of Sophocles, and the *Orestes* and *Iphigenia in Tauris* of Euripides.

**Orfi'la**, MATTHEW JOSEPH BONAVENTURA (1787-1853), a Parisian physician and chemist, b. at Mahon in the island of Minorca; d. at Paris. After taking his degree of M. D. in Paris, he delivered lectures on botany, chemistry, and anatomy, which, along with his medical practice, soon gave him a high reputation and a prominent position. Having been naturalized in France in 1818, he was next year appointed professor of medicine and toxicology at Paris, and in 1823 became professor of medical chemistry and medical jurisprudence. He wrote several important works on toxicology and medical jurisprudence; his *Leçons de Médecine Légale* and his *Traité de Toxicologie*, were translated into most of the languages of Europe.

**Organ** (Greek *orgānon*; an instrument), a wind instrument of music, the grandest of musical instruments, the introduction of which into the church service has undoubtedly exercised a powerful influence on the development of musical art. It is stated to be of very ancient origin, but is most probably the offspring



## Organ

of the *hydraulicon* or *water organ* of the Greeks. The early organs were very imperfect instruments, but improvements were naturally made from time to time, the most notable being those of the sixteenth century, when the bellows were much improved and the division of all the pipes into different stops invented, and the tone of the instrument adapted to the choir. The invention of the *wind chest* in the seventeenth century, by which an equal pressure of wind can be obtained from all the bellows, led chiefly to the present perfect state of the organ. The three essentials of an organ are: 1, a chest of compressed air; 2, a set of pipes producing musical sounds in communication with this chest; 3, a keyboard or clavier, by means of which this communication may be opened or closed at pleasure. The air is forced into the wind chest by means of bellows. To the upper part of each wind chest is attached a *sound-board*, a contrivance for conveying the wind to any particular pipe or pipes at pleasure, and divided into as many grooves as there are keys. Air is admitted into these grooves by means of valves or pallets, which are connected with the keys; the transmission of air being regulated by the *register* or *slide*. The series of pipes above each slide is called a stop. The principal stops of an organ are the *open*, *stopped*, and *double diapasons*; the *principal*, *dulciana*, *twelfth*, *fifteenth*, *flute*, *trumpet*, *clarion*, *bassoon*, *cremona*, *oboe*, and *vox humana*. An organ may have several wind chests filled by the same bellows, and several keyboards, each keyboard and wind chest representing a distinct organ. In the largest instruments the number of these organs generally amounts to five, viz., the *great organ*, the *choir organ*, the *swell organ*, the *solo organ*, and the *pedal organ*. The keyboards for the hand are termed *manuals*, that for the feet the *pedal*. The most usual compass of the manuals is from C to F in alt, four octaves and a half; that of the pedal from CCC to E or F, two and a quarter to two and a half octaves. There are two kinds of organ pipes—*flute pipes* or *mouth pipes*, and *reed pipes*, of each of which there are several species, the character and quality of their sound depending mainly on the material employed in their manufacture (wood or metal), their shape and dimensions. A hydraulic engine has been adapted, with success, to the purposes of working the bellows, and it is now pretty generally adopted. In 1863 a contrivance was patented for transferring some of the work from mechanism to electro-mechanism. An organ built on this principle is termed an *electric organ*. The principal advantages of this description of organ are that it facilitates the playing, and enables the organist to sit at a keyboard at a distance from the instrument. Among the largest organs are those in St. Peter's in Rome, of the Seville Cathedral, of Weingarten in Suabia, of Haarlem, and of Notre Dame, Paris. A free-reed instrument was introduced about 1860 by Mason & Hamlin of New York, known as the *American organ*, differing from the harmonium in having smaller and more curved reeds and

## Origen

drawing the air inward. It is more easily blown than the harmonium, and its tones are of a more organ-like quality, but it is inferior to the latter instrument in variety of tone and power of expression.

**Organ**, in biology, any part of a plant or animal performing a particular function, essential to the life or growth of the individual. Living creatures differ from inanimate beings in the possession of these organs, and hence are said to be composed of *organic* matter, while the latter are called *inorganic*. Even the lowest forms of life display these organs. The most primitive organ is the *nucleus*, in such forms as the *amoeba*. A little higher in the scale appear *cilia*, and each advance through the whole scale of life is marked by an increase in the number, complexity, and specialization of these organs. Examples: lungs, eyes, heart, limbs, stomach, etc.

**Orgies** (Greek, *orgia*), anciently the mystic rites and wild revels celebrated in honor of Bacchus; also the festivals and mysteries of other pagan deities. See *Bacchus* and *Mysterics*.

**Ori' flamme**, until Charles VII's reign, the royal standard of France, originally the banner of the abbey of St. Denis and its lord protector. When the French kings chose St. Denis as their patron saint, they made the oriflamme the principal banner of their armies. It was a piece of red taffeta fixed on a golden spear, in the form of a banner, and cut into three points, each of which was adorned with a tassel of green silk.

**Origen** (or'i-jen) (Origines) (185–254 A. D.), surnamed *Adamentios*, one of the greatest and most influential of the Greek fathers, b. at Alexandria, d. at Tyre. His father suffered martyrdom at Alexandria in 202 under the Emperor Severus, when Origen undertook the support of his mother and six children. He lectured with much success in Alexandria, and gained the patronage of Bishop Demetrius. His own studies were pursued with extraordinary zeal; he lived an ascetic life, and in order to be free from the lusts of the flesh he mutilated himself. A journey to Rome (211–212) greatly increased his reputation, and Christian communities in various countries vied with each other in securing his services. In 228 he went to Palestine; he was so well received, and so many favors were bestowed on him, that his patron became jealous, recalled him to Alexandria, and finally deprived him of his priestly office, charged him with heresy, and expelled him from the city. These persecutions never ceased until the death of Demetrius in 231. In a new persecution, under the Emperor Decius, Origen, who was viewed as a pillar of the church, was thrown into prison, and subjected to the most cruel sufferings, ultimately resulting in his death. He has been reproached with having attempted to blend the Christian doctrines with the notions of Plato, and, without reason, of favoring materialism. He is credited with some 6,000 works, including smaller tracts, but only a few have been transmitted to us, and some of these

## Original Package

only in a distorted form. His work against Celsus is considered as the most complete and convincing defense of Christianity of which antiquity can boast. One of his works was the *Hexapla* (which see), but of it we have only fragments. A translation of his extant works into English has been published.

**Original Package.** In interstate commerce this signifies the package or covering in which goods are shipped. The term has acquired special significance, through a series of decisions of the U. S. Supreme Court, regarding the power of a state to legislate regarding the sale of articles of interstate commerce, and especially concerning liquors, tobacco, etc. While a state can regulate commerce within itself, the U. S. constitution delegates to congress the power to regulate commerce between states. Hence a "Prohibition" state can prohibit the sale or manufacture of liquors in the state, but according to the U. S. Supreme Court, imported liquors cannot be regulated by the state, until they become a part of the general mass of its property. And furthermore, goods remaining in the original packages in which they are shipped, and while in the hands of the importers, are not part of the general property of the receiving state and hence are not within its jurisdiction. According to these decisions, it was easy to sell liquors directly to the consumers, in the original packages, and thus avoid state laws. This possibility was extended by exceedingly liberal interpretation of the term "original package." In 1890 a law was passed by which all liquors become subject to the police powers of a state as soon as they arrive within its boundaries. This limited greatly the application of the "original package" decisions, and simplified the enforcement of liquor laws.

**Origin of Species.** See *Species*.

**Orillia**, Simcoe co., Ontario, on Lake Couchiching, 86 mi. n. of Toronto. Railroads: junction of Northern and Midland divisions of Grand Trunk. Industries: carriage works, two flouring mills, two iron foundries, two woolen mills, veneer works, sash and door factories. Surrounding country agricultural. The town was first settled in 1832, and surveyed into town lots in 1841, became a town in 1876. In 1608 the place was a great Indian center and was known as Cahaigue. Pop. est. 1897, 6,000.

**Orinoco**, a river of South America, one of the largest in the world, rising in the Sierra del Parima, near lat.  $3^{\circ} 40' \text{ n.}$ , lon.  $64^{\circ} \text{ w.}$ , and after a circuitous course falling into the Atlantic opposite Trinidad; its principal mouth being 6 leagues wide; length about 1,500 mi. The Orinoco is connected with the Rio Negro, a tributary of the Amazon, by the Cassiquiare, a natural canal joining the two rivers, and it receives the waters of many large rivers. During the rainy season it inundates the immense plains through which it flows, presenting to the eye a boundless expanse of waters. The scenery on its banks is magnificent beyond description. Two remarkable rapids occur in the upper part of the Orinoco, and from

## Orissa

these the river is navigable to its mouth (about 780 mi.).

**Oriole**, a name popularly applied to two groups of birds, the one group included in the Conirostral section of the Insesores or perching birds, the other classified with the Denti-rostral section. The American orioles belonging to the former group are nearly allied to the starlings. The Baltimore bird (which see), oriole, or golden robin, is a familiar species of this group. Another, the orchard oriole, is distributed very generally over the U. S. The



Golden Oriole.

orioles proper, or those of the Old World, are nearly related to the thrushes. They are found in Asia, Africa, the islands of the Indian Archipelago, and Southern and Eastern Europe. The golden oriole is the typical form, and the only European member of the group. The wings and tail of the males are black, and contrast powerfully with the golden color of the body. In size it resembles a common thrush or blackbird. It chiefly inhabits Southern Europe. The song is loud and resembles the song of the flute.

**Ori'on**, a hero of Greek mythology. According to Homer he was a beautiful youth, of whose charms Eös (Aurora) became enamored. The gods were jealous of her love, and Artemis slew him with her arrows. According to other writers he was a great hunter of colossal stature, and died of the sting of a scorpion. The hero after his death was placed with his hounds in the heavens as a constellation, which bears his name.

**Ori'on**, a constellation situated in the southern hemisphere with respect to the ecliptic, but the equinoctial passes nearly across its middle. This constellation is represented by the figure of a man with a sword by his side. It contains seven stars, which are very conspicuous to the naked eye; four of these form a square, and the three others are situated in the middle of it in a straight line, forming what is called the *Belt of Orion*, and popularly the *Ell-wand* or *Yard-wand*.

**Oris'sa**, a maritime province of Hindustan, lying on the Bay of Bengal, between Bardwan and the Madras Presidency, forming a division or commissionership under the jurisdiction of

## Orizaba

the lieutenant governor of Bengal. It has an area of 9,053 sq. mi., and includes the three districts of Balasore, Cattack, and Puri, and a number of tributary states. The surface along the shore is in general low and sandy and in the interior wild and rugged. The inhabitants are composed chiefly of Oorias, the conquerors of the country; and of wild hill tribes. The largest river is the Mahánadi. The chief towns are Cattack, Puri or Juggernaut, and Balasore. Pop. 3,380,735.

**Oriza'ba**, a town of Mexico, state Vera Cruz, 65 mi. w.s.w of Vera Cruz, and on line of railway connecting the latter city with Mexico. It lies in a fertile valley, 3,975 ft. above sea level, and is a rapidly improving trade center. Tobacco, grown in the neighborhood, is extensively manufactured, also leather and woolen cloths. In its vicinity is the extinct volcano, the Pico de Orizaba 17,665 ft. high. Pop. about 20,000.

**Orkney Islands** (the ancient *Orcades*), a group lying off the northern coast of Scotland, and separated from it by a channel called the Pentland Firth about 6 to 8 mi. broad; aggregate area 375 sq. mi. There are 67 islands and islets, 28 of which are inhabited. Pomona or Mainland is the largest of the group; others of considerable size are, Hoy, South and North Ronaldshay, Westray, and Shapinshay. Excepting Hoy, none of the islands have hills of any height; there are no large streams, but many lakes and springs. The climate is moist but not cold, being remarkably mild in winter. Agriculture, pasturing, and fishing are the supports of the inhabitants, manufactures being restricted to hosiery, chiefly hand-made by women. The fisheries are vigorously prosecuted. Agriculture is not in a flourishing condition, and the crofters of the islands were included in the Crofter's act of 1886. The chief town is Kirkwall. It is probable that the Picts originally possessed the islands, but in the eighth century and subsequently they were occupied by the Northmen. In the ninth century Harold Haarfager attached them to Norway, and for several centuries they were ruled by jarls or earls, who sometimes owned allegiance to Norway, sometimes to Scotland. About the middle of the thirteenth century they were transferred to Alexander, king of Scotland; but the Norwegians continued to assert their sovereignty. James III of Scotland received the islands as a dowry with Margaret of Norway in 1469, and ever since they have belonged to Scotland. Pop. 30,438.

**Orléans** (or-lā-ān), a city of France, formerly capital of Orléanais, now of the department of the Loiret, situated on the right bank of the Loire, 68 mi. s.w. of Paris. It has some handsome public squares, a Gothic cathedral, two hôtels-de-ville, a palais de justice, and other notable buildings. The manufactures and trade of the place have much declined; confectionery, pottery, and woolen goods are the staple articles of manufacture. Philip of Valois erected Orléans into a duchy and peerage in favor of his son, and Orléans has since

## Orléans

continued to give the title of duke to a prince of the blood-royal. In 1428 the city sustained a siege against the English, and was relieved by the Maid of Orléans (see *Joan of Arc*), whose statue in bronze stands in one of the public squares. It was taken and retaken more than once in the Franco-German War in the latter part of 1870. Pop. 51,208.

**Orléans**, a French royal family, two houses of which have occupied the throne of France, 1, On the death of Charles VIII without issue in 1498, Louis, duke of Orléans, great grandson of their common ancestor Charles V, and grandson of the first duke of Orleans, being the nearest heir, ascended the throne under the title of Louis XII. Henry III (d. 1589) was the last sovereign of this house, or the *Valois-Orléans* branch. 2, The house of *Bourbon-Orléans* is descended from Philip, duke of Orléans, son of Louis XIII and younger brother of Louis XIV. His son Philip, duke of Orléans, was regent of France during the minority of Louis XV. His grandson Louis-Philippe Joseph, who assumed the surname of *Egalité*, was beheaded in 1793. See article below. Louis Philippe, duke of Chartres, afterward king of the French, was the son of *Egalité*. The grandson of Louis-Philippe, the Comte de Paris, b. 1838, and educated in England, is now the head of the royal house and royalist party of France. See *Bourbon* and *Paris*, *Comte de*.

**Orléans**, JEAN BAPTISTE GASTON, DUKE OF (1608-1660), third son of Henry IV of France, and Mary of Medici. His early education was miserable, and the cause of the feebleness of character which he displayed through life, although he had received from nature much more of his father's spirit than his brother Louis XIII. The latter was jealous of the duke, and opposed him in many ways, while the duke retaliated by intriguing against the king; and but for Richelieu, who was a greater power in the state than the royal family itself, might have succeeded. During the disturbances of the Fronde he joined De Retz, the soul of the Fronde, who, however, soon saw through the character of his fickle and feeble confederate. After the termination of the troubles (1648) the duke was banished to Blois.

**Orléans**, LOUIS PHILIPPE JOSEPH, DUKE OF (*Egalité*), (1747-1793), great-grandson of the regent, Philippe, duke of Orléans, married in 1769 the daughter of the Duke of Penthièvre. His opposition to the court began in 1771, and he became the rallying point of its enemies. In 1787, he was exiled for the part he took in the Assembly of Notables; in 1789 he was one of the nobles who joined the Tiers Etat (Third Estate); in 1792 he went over to the revolutionary party, without reserve, took the name of *Philippe Egalité* ('Philip Equality'), and voted for the death of Louis XVI. It did not save him from being arrested as a Bourbon, condemned and beheaded.

**Orléans**, MAID OF. See *Joan of Arc*.

**Orléans**, PHILIPPE, DUKE OF (1640-1701), only brother of Louis XIV of France, and founder of the house of Bourbon-Orléans, which for a

## Oriéans

short time held the throne of France. In his twenty-first year he married Henrietta of England, sister of Charles II. The great esteem which the king showed for this princess excited the jealousy of his brother, and her sudden death was attributed to poison, to the administration of which the duke was suspected of being accessory. The second marriage of the duke, with the Princess Elizabeth of the Palatinate (1671), was arranged by Louis to secure the neutrality of the Elector Palatine in the approaching war against Holland. In this war the duke distinguished himself in spite of his effeminacy.

**Oriéans, PHILIPPE DUKE OF.** (1674-1723), Regent of France, son of Philippe, duke of Orleans (see preceding article), and the Princess Palatine Elizabeth. He fell early under the influence of the clever and unscrupulous Abbé (afterward Cardinal) Dubois, who continued his confidant and adviser through life. In 1692 he married Mdle. de Blois, the legitimated daughter of Louis. In 1707 he was appointed to succeed the Duke of Berwick in Spain, and completed the subjugation of that country. He was recalled, however, being suspected of intriguing for the crown of Spain, and again forced into retirement. On the death of the king (Sept. 1, 1715) he was appointed regent. On acceding to power the regent found the finances in extreme disorder, and endeavored to improve matters by retrenchment and peace; but his reckless introduction of a vast paper currency brought the nation to the verge of bankruptcy. He resigned the government to Louis XV, on Feb. 13, 1723.

**Orloff**, a Russian noble family, of whom the following members may be mentioned: **GREGORY ORLOFF** (1734-1783), assisted the Grand Princess Catharine in the revolution, by which she was declared Empress (Catharine II), and her husband, the Emperor Peter III, deprived of life. Orloff soon attained the highest dignities and became enormously rich. **ALEXIS**, his brother (1737-1808), is famous for his devotion to the empress, as one of the murderers of Peter III, and as the admiral who defeated the Turkish fleet off Tschesme. **ALEXIS FEDORVITCH** (1787-1861), prince, a descendant of the same family. In 1825 he gained the favor of Nicholas I by assisting to suppress the revolt of the guards on his accession. He held a calvary command in the Turkish campaign of 1828, and assisted in suppressing the Polish insurrection in 1831; he also rendered successful diplomatic service, especially at Constantinople. In 1844 he was appointed chief of the gendarmes and secret police. He was the confidential friend of the emperor.

**Ormuz** (or Hormuz), an island in the Persian Gulf, on the north side, near its entrance, about 15 mi. in circumference. It is entirely destitute of vegetation, and is only noticeable as having once been a great trade center. It was held by the Portuguese from 1515 to 1622. A few ruins are all that is left of its former wealth and splendor.

**Ormuzd** (*Ahuramazda*, the Oromasdes of the Greeks and Romans), the name of the supreme

## Orphan Asylum

deity of the ancient Persians. According to the doctrine of Zoroaster he was the lord of the universe and the creator of earthly and spiritual life, the source of light, wisdom, and intellect, and the giver of all good. He rewards the good and punishes the wicked. See *Zoroaster*.

**Ornithology.** See *Birds*.

**Ornithorhynchus**, the duck-billed water mole of Australia. With the porcupine anteater of Australia it forms the lowest division



*Ornithorhynchus.*

of the mammalian class. This curious animal was first described by Shaw in 1792, and caused no little excitement among zoologists. It presents a quadruped, of the shape and size of a small otter, covered with short brown fur; a horny flat bill like a duck; a short flat tail; short legs with five-toed and webbed feet, terminated by claws.



*Ornithorhynchus asleep.*

The eyes are small; external ears wholly wanting. The skull is bird-like in conformation; brain without convolutions; coracoid bones as in birds well developed. Its young are produced from eggs, are born blind and hairless, and suckled from milk glands destitute of nipples. It forms large burrows in river and lake banks, rising from near the surface of the water to a height of perhaps 20 ft. above it, the nest being at the higher end. It swims for its food, which consists of insects, worms, larvæ, etc.

**Oron'tes**, a river of Syria, rising on the east of the Anti-Libanus, and entering the Mediterranean; entire course about 200 mi. It is not navigable.

**Orota'va**, a town and port of the Canary Islands, in the northwest of the island of Tenerife. The town is about 3 mi. from the port, and is a favorite summer residence of the rich Canarians. The port has a considerable trade. Pop. 8,293.

**Orphan Asylum** (or Orphanage), an establishment in which orphans are provided for and educated. In all well-regulated states the duty of taking care of destitute orphans was recognized at an early age, and it appears that the cities of Thebes, Athens, and Rome had establishments in which orphaned, deserted,



and illegitimate children were supported and educated at the public expense. In the laws of Emperor Justinian there is frequent mention of such institutions. In the Middle Ages such asylums were numerous and generally under the direction of the clergy. In recent times public orphanages have been substituted or supplanted by the farming out system, that is, the children are brought up in private families willing to undertake their charge. This system, with due care in the selection of guardians and judicious supervision, has proved satisfactory wherever it has been tried. It is more economical, and the example of respectable family life cannot fail to have a beneficial moral influence. Orphan asylums, as conducted in the U. S., are supported as private institutions, assisted by legislative appropriation. They are fostered also by the religious denominations.

**Orpheus** (or' fūs), a personage of great importance in the mythology of Greece, surrounded by a multitude of legends, which invariably associate him with Apollo and the Muses. To him is attributed the application of music to the worship of the gods. Apollo presented him with his lyre, and the Muses instructed him to use it, so that he moved not the beasts only, but the woods and rocks with its melody. Having lost his wife Eurydice by the bite of a serpent he descended into Hades to try and get her back. His music so moved the infernal deities Pluto and Proserpine that they consented to her return to earth, only her husband, whom she was to follow, must not look back till they had reached the upper world. This condition the impatient Orpheus violated and lost his wife forever. He is said to have met his death at the hands of a band of furious women engaged in the mystic rites of Bacchus. He is represented as one of the Argonauts, and to him is ascribed the origin of the so-called Orphic mysteries connected with the worship of Bacchus. A considerable literature was connected with the name of Orpheus, the oldest portions of which were not earlier than 530 B.C. In part it yet exists, there being still extant a mythological poem called *Argonautica*, certain hymns, etc.

**Orrery**, CHARLES BOYLE, EARL OF (1676-1731). He was educated at Oxford, and succeeded his brother in the earldom (an Irish title) in 1708. For his services in connection with the Treaty of Utrecht he was created a British peer, as Lord Boyle. He published an edition of *Phalaris*, which gave rise to the controversy with Doctor Bentley.

**Orris Root** (or Iris Root), the root of several species of *Iris*, especially of the *I. florentina*, which on account of its violet-like smell is employed in perfumery, and in the manufacture of tooth powder. It is also used in pharmacy as a pectoral.

**Orsini**, one of the most illustrious and powerful families of Italy. It became known about the eleventh century, and had already acquired high rank and extensive possessions in the Papal States when one of its members, Giovanni Gaetano, was raised to the pontificate

under the title of Nicholas III (1277-80). The feud between the Orsini and Colonna families is celebrated in history; it commenced toward the close of the thirteenth century, and is distinguished for bitterness, unscrupulousness, and violence, assassination being not infrequently resorted to. Many of the Orsini became famous military chiefs. Vincenzo Marco Orsini (Benedict XIII) succeeded Innocent XIII as pope in 1724. The Orsini family is now divided into two branches, the Orsini-Gravina at Rome and the Orsini of Piedmont.

**Orsini**, FELICE (1819-1858), an Italian revolutionist. In 1838 he was sent to study law at the University of Bologna, and joined the Society of Young Italy, formed in 1831 by Mazzini. In 1843 he took an active part in an insurrection, and being apprehended along with his father, also an ardent patriot, was sentenced to the galleys for life. By the amnesty of July 16, 1846, he obtained his freedom, but soon after he again engaged in intrigues under Mazzini, and took prominent part in the stirring events of the following years. In 1855 he was condemned to death, but the sentence was not carried out, and in 1856 he escaped to London. Here he wrote his work, *Austrian Dungeons in Italy* (1856), and lived by giving lectures on his adventures. He now planned the assassination of Napoleon III as the main prop of reactionary tendencies in Europe, in concert with three Italian refugees, Rudio, Gomez, and Pieri. The attempt was made on Jan. 14, 1858, but was unsuccessful, and Pieri and Orsini were executed March 13, 1858, Gomez and Rudio being sentenced to imprisonment for life.

**Orsted** (or Oersted) (eur'sted), HANS CHRISTIAN (1777-1851), Danish physicist. He studied at the University of Copenhagen, spent several years at the expense of the government in Holland, Germany, and Paris; was in 1806 appointed extraordinary professor of physics at Copenhagen; and in 1812-13, while on a second tour in Germany, he drew up his views of the chemical laws of nature, which he afterward published in Paris under the title of *Recherches sur l'Identité des Forces Electriques et Chimiques*. His fame first became diffused over the scientific world in 1819 by the discovery of the fundamental principles of electro-magnetism. In 1829 he became director of the Polytechnic School of Copenhagen, and on the occasion of his jubilee festival in 1850 he was created a privy-councillor.

**Or' thite**, a silicate of aluminum containing the rare metals cerium, lanthanum, didymium, and yttrium, occurring in granite and other rocks in Sweden, Greenland, the Ural, etc.

**Or' thodox** (Greek, *orthos*, right, and *doxa*, opinion), the opposite of *heterodox*, generally applied to what is regarded as the established opinion, or to that which is commonly considered as right. The term is chiefly used in religious controversies to designate certain religious faiths or doctrines.

**Orthopædia** (Greek, *orthos*, straight, *paideia*, training), a branch of medical science relating to the cure of natural deformities. Hippocra-

## Ortler Spitzze

tes already occupied himself with the correction of deformed bones, but it was not until a comparatively recent epoch that this important subject met with the serious attention it deserved. Several institutions for the cure of bodily malformations were founded in France and Germany in the early part of this century. Orthopædia is divided into prophylactic or preventive, and therapeutic or curative. The object of the former is to prevent deformities in infants, and is obtained by hygienic means, such as pure air, careful nursing, and suitable food, clothing, and exercise; that of the latter is to correct deformities already existing by mechanical treatment, which is most successful when resorted to as soon as any deviation from natural shape manifests itself. In our time the manufacture of orthopædic apparatus has become highly developed, and forms an important branch of trade.

**Ortler Spitzze** (or Ortler), a mountain of the



Ortolan.

Alps, in Tyrol, near the borders of Switzerland and Italy, the highest of the Australian and German Alps; height 12,814 ft. The group to which this mountain belongs is known as the Ortler Alps.

**Ortolan**, a bird of the bunting family, a native of Northern Africa and Southern Eu-

rope. The colors are yellow on the throat and around the eyes, the breast and belly being of reddish hue, while the upper part of the body is brown varied with black. Its delicate flesh is much esteemed by epicures, and large quantities are annually caught and fattened for the table in the south of France, Italy, and Cyprus.

**Oruro**, a town of Bolivia, capital of a department of the same name, on a bleak hill in a metalliferous district, at an absolute height of 13,000 ft. It has lost its former importance, and the population, once exceeding 40,000, is now below 12,000. The department has an area of 25,640 sq. mi. Pop. 170,000.

**Oryx**, the name of the genus of antelopes represented by the addax, and by other species, found in large herds chiefly in the northern portions of the African continent. The horns are very long, spiral, and curved backward. The gemsbok of South Africa is another species included in this genus.

**Osage City**, Osage co., Kan. Railroads: A. T. & S. F.; C. K. & W.; and Missouri Pacific. Industries: brick yard and many coal mines. Surrounding country agricultural and mineral. The town was first settled in 1866, and became a city in 1872. Population, 1900, 2,792.

## Osiris

**Osage**, a river which rises in Kansas, flows through Missouri, and after a winding course of 500 mi. joins the Missouri 10 mi. below Jefferson City. The river gave name to an Indian tribe, the remnant of which now inhabits the Indian Territory.

**Osage Orange**, a tree indigenous to North America, where it is frequently used as a hedge plant. It produces a large yellow fruit of woody texture, somewhat resembling an orange, but not edible.

**Osa'ka** (or Ohosa'ka), the second city and a free port of Japan, in the island of Hondo, on the estuary of the Yodo Gawa, 28 mi. s.s.w. of Kioto. It is intersected by canals, which are spanned by numerous wooden bridges. The banks of the main channel are lined for 2 or 3 mi. with the residences of the nobles, and it has a strong citadel. A railway connects it with Yeddo. The greater part of its foreign trade is carried on at Hiogo. Pop. 473,541.

**Oscar I**, JOSEPH FRANÇOIS BERNADOTTE (1799-1859), king of Sweden and Norway, son of Bernadotte (Charles XIV), b. at Paris. In 1823 he married Joséphine, eldest daughter of Prince Eugène Beauharnais. During the reign of his father he was three times (in 1824, 1828, and 1833) viceroy of Norway, where he made himself popular by his good administration. He acceded to the throne in 1844; reformed the civil and military administration of the state; abolished primogeniture; established complete liberty of conscience; encouraged education and agriculture; promoted railways, telegraphs, etc. He took little part in foreign politics. He resigned in favor of his eldest son in 1857.

**Oscar II**, king of Sweden and Norway, b. 1829; succeeded his brother, Charles XV, in 1872. He is a writer of some merit; has translated Goethe's *Faust* into Swedish, and published a volume of poems under the pen-name of Oscar Frederik. Pl. 31, Vol. IV.

**Oshawa**, Ontario co., province of Ontario, on Lake Ontario 33 mi. e. of Toronto. Railroads: Grand Trunk and Oshawa electric. Industries: carriage works, flouring mills, iron foundry, woolen mill, tannery, brass foundry, planing mill, metal roofing co., etc. Surrounding country agricultural and stock raising. The town was first settled about 1820. Pop. 4,200.

**Oshkosh**, Winnebago co., Wis., on Lake Winnebago and Fox river, 160 m. n. of Chicago. Railroads: C. & N. W., C. M. & St. P., and Wisconsin Central. The principal industries are lumber companies, flouring mills, iron foundries and sash and door factories. The town was settled in 1836, and became a city in 1853. Oshkosh was named for a famous Menominee chief. It is the seat of a state normal school. Pop. 1900, 28,284.

**Osi'ris**, one of the great Egyptian divinities. He was the brother and husband of Isis, and the father of Horus. He is styled the manifestor of good, lord of lords, king of the gods, etc. In the Egyptian theogony he represented the sum of beneficent agencies, as Set of evil agencies. Osiris, after having established good

## Oskaloosa

laws and institutions throughout Egypt fell a prey to the intrigues of his brother Set the Typhon of the Greeks. He became afterward the judge of the dead. There are a multitude of traditions, both Greek and Egyptian, about Osiris. He is represented under many different forms, and compared sometimes to the sun and sometimes to the Nile. His soul was supposed to animate the sacred bull Apis, and thus to be continually present among men. His worship extended over Asia Minor, Greece, and Rome; the rise of Christianity put an end to it.

**Oskaloosa**, Mahaska co., Iowa, 52 mi. s. e. of Des Moines. Surrounding country agricultural, underlaid with coal. Railroads: C. R. I. & P.; Iowa Central; C. B. & Q. Industries: brick paving co., four flouring mills, three iron foundries, factories, etc. The town was first settled in 1844 and became a city in 1853. Pop. 1900, 9,212.

**Osman Digma**, a Soudanese slave merchant and lieutenant to the Mahdi, b. at Suakin about 1830, of Turkish descent on his father's side. He has proved himself one of the ablest leaders on the Mahdist side, having defeated an Egyptian force under Baker Pasha in 1884 near the Red Sea coast of the Soudan. He was defeated soon after by a British force, and again in 1885, but not without causing severe losses.

**Osman'leh**, a Turkish order established by Abdul Aziz in 1861 for the reward of services rendered to the state. The chief decoration is a golden six-pointed star enameled in green.

**Osman Pasha**, Turkish general, b. at Tokat in Asiatic Turkey 1832; entered the Turkish army in 1853; fought with distinction in the Crimean War, the Syrian rebellion, and the Crete Campaign, but his great achievement was the defense of Plevna during the Russo-Turkish War (1877). He afterward held the office of war minister and several other high posts. Died in Constantinople, April 4, 1900.

**Os'mium**, one of the platinum metals, forming a bluish-white lustrous mass, having a specific gravity of 22.48, being thus the heaviest of all bodies. It may also be obtained in crystals, or as a black amorphous powder, which is very combustible. Osmium is the most infusible of all the metals. It combines with chlorine in different proportions, also with sulphur, and forms alloys with some other metals. Osmic acid acts as a powerful oxidizer, decarbonizing indigo, separating iodine from potassium iodide, converting alcohol into acetic acid, etc.

**Osmo'sis** (Os'mose), the tendency of fluids to pass through porous partitions and mix or become diffused through each other. It includes *endosmose*, or the tendency of a fluid to pass inward into another through such a partition, and *exosmose*, or the tendency of a fluid outward. When two saline solutions, differing in strength and composition, are separated by a bladder, parchment paper, or porous earthenware, they mutually pass through and mix with each other; but they pass with unequal rapidities, so that, after a time the height of the liquid on each side is different.

## Ossoli

Of all vegetable substances sugar has the greatest power of endosmose, and of the animal substances albumen has the greatest. Graham showed that osmose was due to the chemical action of the fluids on the septum. In fact the corrosion of the septum seems necessary for the existence of osmose. See also *Diffusion*.

**Osnabrück** (or Osnaburg), an ancient town of Prussia, in Hanover, on the Hase, and 71 mi. w. of Hanover. In the old town it possesses many interesting buildings in Gothic and Renaissance style. It was formerly an important seat of linen manufacture; and gave a name to the kind of coarse linen known as osnaburg. Its chief manufactures are now chemicals, iron and steel, paper, cotton, and tobacco. Pop. 35,899.

**Osprey**, a well-known raptorial bird, called also *fishing hawk*, *fishing eagle*, and *sea eagle*. It occurs both in the Old and the New World, near



Osprey.

the shores of the sea, or great rivers and lakes, and builds its nest in high trees and cliffs. It lives on fish, and pounces with great rapidity on its prey, as it happens to come near the surface of the water, the toes being armed with strong curved nails. The general body-color is a rich brown, the tail being banded with light and dark (in the old birds the tail is pure white), head and neck whitish on their upper portions, and a brown stripe extends from the bill down each side of the neck; under parts of the body whitish, legs of a bluish tint. In length the osprey averages about 2 ft., the wings measuring over 4 ft. from tip to tip. The female lays three or four eggs. The American bald eagle pursues the osprey, who drops his prey with the view of escaping, when the eagle immediately pounces after the descending fish, and seizes it ere it touches the water.

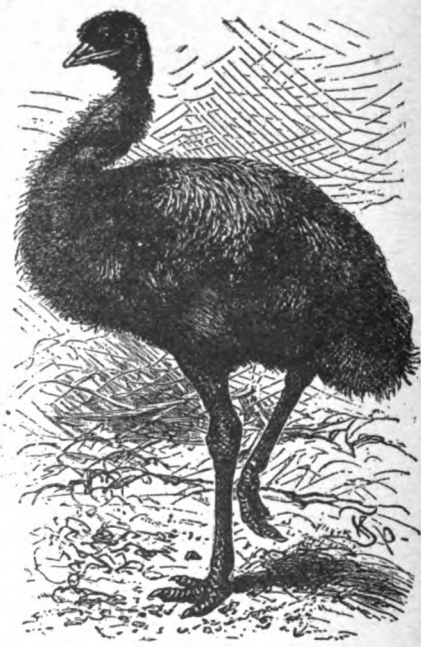
**Ossa**, a mountain of Northern Greece, in Thessaly, separated by the vale of Tempe from Mount Olympus; height 6,348 ft.

**Os'soli**, MARGARET SARAH FULLER (1810-1850), an American authoress, remarkable for her precocious and extensive linguistic attainments. She became associated with Em-





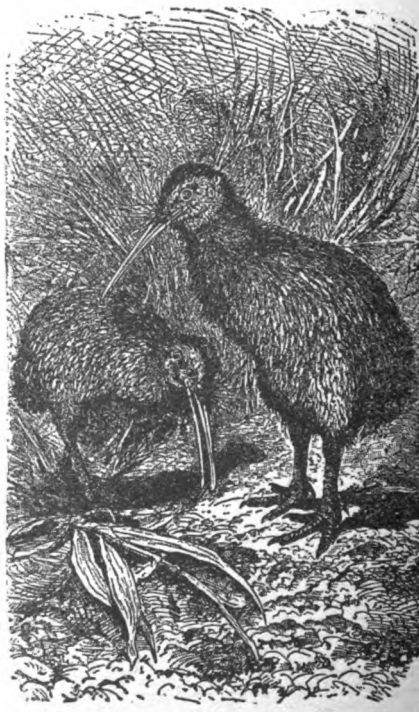
1. American Ostrich (*Rhea americana*).



2. Australian Ostrich (*Emu*).



3. Australian Ostrich (*Cassowary*).



4. Kiwi (*Apteryx australis*).



## Ostend

erson and other eminent literary men. In 1840 she started and edited the *Dial* (a social and philosophical magazine), and in 1844 became a writer to the *New York Tribune*. She visited Europe in 1846, married in 1847 the Marchese Ossoli; was in Rome during the siege of 1849, when she acted as superintendent of a hospital for the wounded, and embarked with her husband for New York, but they were wrecked, and both perished off Long Island, July 16, 1850. She wrote several works (besides translations), including *Women in the Nineteenth Century*, *Summer on the Lakes*, etc. A new edition of her works was published in Boston (1874).

**Ostend**, a seaport of Belgium, province of West Flanders, on the North Sea, 67 mi. n.w. of Brussels. The cod and herring fishing, and the cultivation of oysters, are considerable industries, and the export of butter, eggs, poultry, and rabbits is extensive. Owing to its extensive firm and smooth sands it is a favorite sea-bathing resort, especially for continental visitors. It dates from the ninth century. It sustained a memorable siege by the Spaniards from July 4, 1601, to Sept. 28, 1604, when it capitulated. Pop. 25,203.

**Osteopathy**, a method of curing disease without drugs. It is based on the assumption that the fluids of the body contain greater or less amounts of every kind of chemical substance and that this store of drugs is capable of destroying every imaginable disease. The only cause of disease is the slight displacement of some bone of the body, which causes an obstruction to the flow of these fluids. To cure any disease, therefore, is to locate the disarranged bone or bones, and make the proper adjustment. Andrew Taylor was the founder and is yet the father of osteopathy. He was a practicing physician and surgeon of the *old school*, but became dissatisfied with that method of curing. He announced the system in 1875 and practiced it with considerable success. Now there are over 3000 practitioners, with about 1000 students in the various colleges. Twenty-three states have recognized the profession and regulate its practice. The objection made to osteopathy is not so much to the method of curing as to the attempt to adapt it to all sorts of diseases. Many medical schools teach the principles of osteopathy and a large number of regular physicians use its methods with some classes of patients.

**Os'tia**, an ancient city of Italy, at the mouth of the Tiber, 6 mi. from Rome by the Via Ostiensis. It was of great importance as the port of Rome and as a naval station, and for a long period it engrossed the whole trade of Rome by sea. The port, however, was never good, and owing to the gradual accumulation of the mud and other deposits brought down by the river, it ultimately became inaccessible to ships of large tonnage. Many efforts were made by various Roman emperors to improve the port, but without much success. It was destroyed by the Saracens in the ninth century. Its ruins comprise tombs, two temples, a theater, etc.

## Ostrich

The modern Ostia (founded by Gregory IV in 830) is a miserable village with but few inhabitants.

**Os'tracism** (Greek, *ostrakon*, a shell), a political measure practised among the ancient Athenians by which persons considered dangerous to the state were banished by public vote for a term of years (generally ten), with leave to return to the enjoyment of their estates at the end of the period. It takes this name from the shell or tablet on which each person recorded his vote. Among the distinguished persons ostracized were Themistocles, Aristides, and Cimon, son of Miltiades, who were afterward recalled.

**Ostrich**, a cursorial bird, of the family Struthionidae, of which it is the type. It inhabits the sandy plains of Africa and Arabia, and is the largest bird existing, attaining a height of from 6 to 8 ft. The head and neck are nearly naked; the general body plumage is black, the wing and tail feathers white, occasionally with black markings, the quill-feathers of the wings and tail have their barbs wholly disconnected, hence their graceful appearance. The legs are extremely strong, the thighs naked. There are only two toes, the hind toe being wanting. The pubic bones are united, a conformation occurring in no other bird. The wings are of small size and are incapable of being used as organs of flight, but the birds can run with extraordinary speed, outdistancing the fleetest horse. The bill is broad and of a triangular depressed shape. The food consists of grass, grain, etc., and substances of a vegetable nature, and to aid in the trituration of this food the ostrich swallows large stones, bits of iron and glass, or other hard materials that come in the way. Ostriches are polygamous, each male consorting with several females, and they generally keep together in flocks. The eggs average 3 lbs. in weight, and several hens often lay from ten to twelve each in the same nest, which is merely a hole scraped in the sand. The eggs appear to be hatched mainly by the exertions of both parents relieving each other in the task of incubation, but also partly by the heat of the sun. The South African ostrich is often considered as a distinct species under the name of *S. australis*. Three South American birds of the same family but of the genus *Rhea*, are popularly known as the American ostrich, and are very closely allied to the true ostrich, differing chiefly in having the head feathered and three-toed feet, each toe armed with a claw. The ostrich has been hunted from the earliest ages for its feathers, which have always been valued as a dress decoration. The feathers of the back are those most valued, the wing and tail feathers rank next. The black plumes are obtained by dyeing. The finest white feathers are exported from Aleppo, Egypt, Tunis, and Algiers, and the bulk of these find their way to Paris. The market value of the feathers naturally varies with their quality, the prevailing fashion, and the supply. At present prime white feathers bring from \$100 to \$250 per lb.

**Oswald**, king of Northumbria (634-642). He ruled over an extensive territory, including Angles, Britons, Picts, and Scots. He labored to establish Christianity on a firm footing, being in this assisted by St. Aidan. He died in battle against Penda of Mercia, and was revered as a saint.

**Oswego**, Oswego co., N. Y., at the mouth of Oswego River. Railroads: N. Y. O. & W.; D. L. & W.; and N. Y. C. & H. R. Industries: starch factory, flour mill, iron works, woolen mill, boiler company, oil box and match factories. Surrounding country agricultural. The town was first settled in 1615 and became a city in 1848. Pop. 1900, 22,199.

**Osyman'dyas**, an ancient king of Egypt, mentioned by Diodorus Siculus, who reports that he invaded Asia with a vast army, and penetrated as far as Bactria, and that on his return he erected at Thebes a monument to himself of unparalleled magnificence, with a sitting colossal statue of enormous size. The Memnonium at Thebes has been represented as his monument.

**Ota'go**, one of the provincial districts of New Zealand; area 15,000,000 acres. The interior is mountainous; many peaks attain the height of from 3,000 to 9,000 ft., but there is much pastoral land; the northeast consists of extensive plains. Otago, although it possesses valuable gold fields, is chiefly a pastoral and agricultural district, second only to Canterbury in wheat production. The largest river is the Clutha or Clyde, the largest of New Zealand. Coal has been found in abundance. Otago was founded in 1848 by the Scotch Free Church Association; it is now the most populous division of the colony. The capital is Dunedin; the next town in importance is Oamaru. Pop. 1,153,097.

**Otho I**, the *Great* (912-973), emperor of Germany, son of Henry I. He was crowned king of Germany at Aix-la-Chapelle in 936. After a fourteen years' struggle he subdued Boleslas, duke of Bohemia; he wrested the duchies of Suabia, Bavaria, and Lorraine from the dukes of Bavaria and Franconia, and gave them (in 949) to his sons Ludolf and Henry, and to his son-in-law Conrad, count of Worms, respectively. Otho was crowned King of Lombardy in 951 and was consecrated Emperor at Rome in 962 by Pope John XII after his expulsion of Berengarius, who had seized upon the territory bestowed upon the Pope by Pepin and Charlemagne. Otho reconfirmed its possession to the Holy See. The Pope having violated a pledge made to Otho caused the latter again to invade Rome, from which John XII suddenly fled to the antipope, Clement VIII. The Byzantine court refused to acknowledge Otho's claim to the imperial dignity; but he defeated the Greek forces in Lower Italy, and the Eastern emperor, John Zimisces, gave the Greek princess Theophania to his son Otho in marriage. The latter became Otho II.

**Otho II** (955-983), youngest son of Otho I, d. at Rome. His elder brothers had all died before their father, who caused him to be crowned king of Rome—the first instance of

the kind in German history. In Italy he suppressed a rising under Crescentius, and then attempted to drive the Greeks from Lower Italy; but they called in the aid of the Saracens from Sicily (981), and Otho suffered a total defeat (982). He escaped by leaping into the sea, was picked up by a Greek ship, from which he afterward escaped by a ruse, and d. soon after at Rome.

**Otho III** (980-1002), son of the preceding, and the last of the male branch of the Saxon imperial house. He was only three years old when he succeeded his father. At the age of fifteen he marched into Italy and crushed a fresh insurrection fomented by Crescentius. He was consecrated emperor in 996 by Gregory V, a near relative of his own. He next suppressed a second rebellion under Crescentius, whom he caused to be beheaded. On the death of Gregory, Otho raised his old tutor, Gerbert, to the pontificate under the title Sylvester II. Peace in Rome was, however, only temporary, and until his death Otho was mostly employed in quelling disturbances in various parts of Italy.

**Otho I** (1815-1867), king of Greece, second son of Louis of Bavaria. In 1832 he was elected king of Greece; but his Germanic tendencies caused continual friction, which ended in a rebellion and his abdication (1862). He spent the latter part of his life in Munich.

**Otho**, MARCUS SALVIUS (32-69 A.D.), Roman emperor. He joined Galba when he rebelled against Nero, and, on his accession in 67, Otho became his favorite and was made consul; but when Galba appointed Piso as his successor Otho bribed the army, had Galba and Piso murdered, and was proclaimed emperor in 69. He was acknowledged by the Eastern Provinces, but in Germany Vitellius was proclaimed by his legions. The latter having led his army into Italy, overthrew the forces of Otho at Bebricum.

**Ottawa**, Franklin co., Kan., on Marias Des Cygnes River, 56 mi. s.w. of Kansas City. Railroads: Santa Fé; Southern Kansas; and Missouri Pacific. Industries: pipe factory, two flouring mills, iron foundry, railroad shops, furniture, shoe, cigar, and soap factories, and creamery. Surrounding country agricultural. Name derived from Ottawa tribe of Indians. The town was first settled in 1864 and became a city in 1867. First railroad train reached the city in 1868. Pop. 1900, 6,934.

**Ot'tawa**, a river in the Dominion of Canada, forming for a considerable part of its length the boundary between the provinces of Quebec and Ontario. It rises in the high land which separates the basin of Hudson's Bay from that of the St. Lawrence, and after a course of some 750 mi. discharges into the St. Lawrence above the island of Montreal. Six miles above the city of Ottawa rapids begin which terminate in the Chaudière Falls, where the river, here 200 ft. wide, takes a leap of 40 ft. Immense quantities of valuable timber are floated down the Ottawa from the wooded regions of the interior to Ottawa City, where it is manufactured into lumber.

## Ottawa

**Ottawa**, Carleton co., Province of Ontario, on Ottawa and Rideau rivers, 120 mi. w. of Montreal. Railroads: Canadian Pacific; Canadian Atlantic; O. & P. S.; St. L. & O.; P. & P. J.; Gatineau Valley; O. & B.; and N. Y. & O. Industries: lumber mills, flouring mills, several iron foundries, car shops, carbon works, pulp and paper mills. Surrounding country agricultural and mining. The town was first settled in 1820 and called a town until 1848 when it became a city. In 1867 selected by the queen as capital of Canada to end disputes between the larger cities. Pop. 1901, 59,902.

**Ottawa**, La Salle co., Ill., on the Illinois River and the Illinois and Michigan Canal. Railroads: C. R. I. & P., and C. B. & Q. It is the center of a rich agricultural district and exports grain and other produce. In the vicinity are coal mines and mineral springs. Other industries include glass works, the manufacture of drain and roof tiles, cigars, lumber, pottery, flour, farming implements, etc. Pop. 1900, 10,588.

**Otter**, a carnivorous mammal, family of weasels. There are several species, differing chiefly in size and fur. They all have large flattish heads, short ears, webbed toes, crooked nails, and tails slightly flattened horizontally. The common river otter, inhabits the banks of



Otter.

ivers, feeds principally on fish, and is often very destructive, particularly to salmon. The under fur is short and woolly, the outer is composed of longer and coarser hairs of dark brown hue. They burrow near the water's edge, line their nest with grass and leaves, and produce from four to five young. The weight of a full-grown male is from 20 to 24 lbs.; length from nose to tail 2 ft., tail 15 to 16 in. The American or Canadian otter averages about 4 ft. in length inclusive of the tail. It is plentiful in Canada, and furnishes a valuable fur, which is a deep reddish brown in winter, and blackish in summer. The sea otters, represented typically by the great sea otter, inhabit the coasts of the North Pacific Ocean, but are of comparatively rare occurrence. The tail is short, measuring about 7 in. only; weight 60 to 70 lbs. The fur is soft, and of a deep lustrous black, or of a dark maroon color when dressed, and much prized.

## Ottoman Empire

In general appearance the sea otter somewhat resembles a small seal.

**Ottoman Empire**, the Turkish Empire, the territories in Europe, Asia, and Africa more or less under the sway of the Turkish sultan. In Europe, besides the immediate provinces in the Balkan Peninsula, are Bulgaria (with Eastern Roumelia), and Bosnia, Herzegovina, etc., held by Austria; in Asia, Asia Minor, Syria, including Palestine, Mesopotamia, part of Arabia, Candia, and others of the islands of the Archipelago; in Africa, Egypt, over which there is a nominal suzerainty, and the vilayet of Tripoli. Formerly the empire was much more extensive, even in recent times comprising Greece, Roumania, Servia, Bessarabia, Tunis, etc. We shall here give a brief sketch of the history of the Ottoman Empire, referring to the article *Turkey* for information regarding the geography, constitution, etc., of Turkey proper.

The Ottoman Turks came originally from the region of the Altai Mountains, in Central Asia, and in the sixth century A.D. pushed onward to the west in connection with other Turkish tribes. Early in the eighth century they came in contact with the Saracens, from whom they took their religion, and of whom they were first the slaves and mercenaries, and finally the successors in the caliphate. In the thirteenth century they appeared as allies of the Seljukian Turks against the Mongols, and for their aid received a grant of lands from the Seljuk sultan of Iconium in Asia Minor. Their leader, Othman or Osman, of the race of Oghuzian Turkomans, became the most powerful emir of Western Asia, and after the death of the Seljuk sultan of Iconium in the year 1300 he proclaimed himself sultan. He died in 1326. Thus was founded upon the ruins of the Saracen, Seljuk, and Mongol power the empire of the Osman or Ottoman Turks in Asia; and after Osman, the courage, policy, and enterprise of eight great princes, whom the dignity of caliph placed in possession of the standard of the prophet, and who were animated by religious fanaticism and a passion for military glory, raised it to the rank of the first military power in both Europe and Asia (1300-1566).

The first of them was Orkhan, son of Osman. He subdued all Asia Minor to the Hellespont, took the title of *Padishah*, and became son-in-law to the Greek emperor Cantacuzenus. Orkhan's son, Soliman, first invaded Europe in 1355. He fortified Gallipoli and Sestos, and thereby held possession of the straits which separate the two continents. In 1360 Orkhan's second son and successor, Amurath I, took Adrianople, which became the seat of the empire in Europe, conquered Macedonia, Albania, and Servia, and defeated a great Slav confederation under the Bosnian king Stephen at Kossova in 1389. After him Bajazet, surnamed Ilderim (*Lightning*), invaded Thessaly, and also advanced toward Constantinople. In 1396 he defeated the Western Christians under Sigismund, king of Hungary, at Nicopolis, in Bulgaria; but at Angora in 1402 he was himself conquered and taken prisoner by Timour, who



## Ottoman Empire

divided the provinces between the sons of Bajazet. Finally, in 1413 the fourth son of Bajazet, Mohammed I, seated himself upon the undivided throne of Osman. In 1415 his victorious troops reached Salzburg and invaded Bavaria. He conquered the Venetians at Thessalonica in 1420; and his celebrated grand-vizier Ibrahim created a Turkish navy. Mohammed was succeeded by his son, Amurath II, who defeated Ladislaus, king of Hungary and Poland, at Varna in 1444. Mohammed II, the son of Amurath, completed the work of conquest (1451-81). He attacked Constantinople, which was taken May 29, 1453, and the Byzantine Empire came finally to an end. Since that time the city has been the seat of the Sublime Porte or Turkish government. Mohammed added Serbia, Bosnia, Albania, and Greece to the Ottoman Empire, and threatened Italy, which, however, was freed from danger by his death at Otranto in 1480. His grandson, Selim I, who had dethroned and murdered his father in 1517, conquered Egypt and Syria. Under Soliman II, *the Magnificent*, who reigned between 1519 and 1566, the Ottoman Empire reached the highest pitch of power and splendor. In 1522 he took Rhodes from the Knights of St. John, and by the victory of Mohacz in 1526 subdued half of Hungary. He exacted a tribute from Moldavia, made Bagdad, Mesopotamia, and Georgia subject to him, and threatened to overrun Germany, but was checked before the walls of Vienna (1529). Soliman had as an opponent Charles V of Germany, as an ally Francis II of France. From his time the race of Osman degenerated and the power of the Porte declined.

In the latter part of the sixteenth century, and most of the seventeenth century, the chief wars were with Venice and with Austria. The battle of Lepanto (1571), in which the Ottoman fleet was overthrown by the combined fleets of Venice and Spain, was the first great Ottoman reverse at sea; and the battle of St. Gothard (1664), near Vienna, in which Montecuculi defeated the Vizier Kiuprili, the first great Ottoman reverse on land. In 1683 Vienna was besieged by the Turks, but was relieved by John Sobieski and Charles of Lorraine; in 1687 the Turks were again defeated at Mohacz, and in 1697 (by Prince Eugene) at Senta. Then followed the Treaty of Carlowitz in 1699, by which Mustapha II agreed to renounce his claims upon Transylvania and a large part of Hungary, to give up the Morea to the Venetians, to restore Podolia and the Ukraine to Poland, and to leave Azov to the Russians. Eugene's subsequent victories at Peterwardein and Belgrade obliged the Porte to give up, by the Treaty of Passarowitz in 1718, Temeswar, Belgrade, with a part of Serbia and Walachia; but the Turks on the other hand took the Morea from Venice, and by the Treaty of Belgrade in 1739 regained Belgrade, Serbia, and Little Walachia, while for a time they also regained Azov.

Russia, which had been making steady advances under Peter the Great and subsequently, now became the great opponent of

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Turkey. In the middle of the eighteenth century the Ottoman Empire still embraced a large part of Southern Russia. The victories of Catharine II's general Romanzoff in the war between 1768 and 1774 determined the political superiority of Russia, and at the Peace of Kutchuk-Kainargi, in 1774, Abdul-Hamid was obliged to renounce his sovereignty over the Crimea, to yield to Russia the country between the Bog and the Dnieper, with Kinburn and Azov, and to open his seas to the Russian merchant ships. By the Peace of Jassy, 1792, which closed the war of 1787-91, Russia retained Taurida and the country between the Bog and the Dniester, together with Otchakov, and gained some accessions in the Caucasus. In the long series of wars which followed the French Revolution the Ottoman Empire first found herself opposed to France, in consequence of Bonaparte's campaign in Egypt, and finally to Russia, who demanded a more distinct recognition of her protectorate over the Christians, and to whom by the Peace of Bucharest, May 28, 1812, she ceded that part of Moldavia and Bessarabia which lies beyond the Pruth. In 1817 Mahmud II was obliged to give up the principal mouth of the Danube to Russia. Further disputes ended in the Porte making further concessions, which tended toward loosening the connection of Serbia, Moldavia, and Walachia with Turkey. In 1821 broke out the war of Greek independence. The remonstrances of France, Britain, and Russia against the cruelties with which the war against the Greeks was carried on proving of no avail, those powers attacked and destroyed the fleet of Mahmud at Navarino (1827). In 1826 the massacre of the Janizaries took place at Constantinople, after a revolt. In 1828-29 the Russians crossed the Balkans and took Adrianople, the war being terminated by the Peace of Adrianople (1829). In that year Turkey had to recognize the independence of Greece. In 1831-33 Mehemet Ali, nominally pasha of Egypt, but real ruler both of that and Syria, levied war against his sovereign in 1833, and threatened Constantinople; when the Russians, who had been called on for their aid by the sultan, forced the invaders to desist. In 1840 Mehemet Ali again rose against his sovereign; but through the active intervention of Austria, Great Britain, and Russia, was compelled to evacuate Syria, though he was, in recompense, recognized as hereditary viceroy of Egypt.

The next important event in the history of the Ottoman Empire was the war with Russia in which Turkey became involved in 1853, and in which she was joined by England and France in the following year. This war, known as the Crimean War (which see), terminated with the defeat of Russia, and the conclusion of a treaty at Paris on March 30, 1856, by which the influence of Russia in Turkey was greatly reduced. The principal articles were the abolition of the Russian protectorate over the Danubian principalities (Moldavia and Walachia, united in 1861 as the principality of Roumania), the rectification of the frontier between Russia

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and Turkey, and the cession of part of Bessarabia to the latter power.

In 1875 the people of Herzegovina, unable to endure any longer the misgovernment of the Turks, broke into rebellion. A year later the Servians and Montenegrins likewise took up arms, and though the former were unsuccessful and obliged to abandon the war, the Montenegrins still held out. Meantime the great powers of Europe were pressing reforms on Turkey, and at the end of 1876 a conference met at Constantinople with the view of making a fresh settlement of the relations between her and her Christian provinces. All the recommendations of the conference were, however, rejected by Turkey; and in April following, Russia, who had been coming more and more prominently forward as the champion of the oppressed provinces and had for months been massing troops on both the Asiatic and the European frontier of Turkey, issued a warlike manifesto and commenced hostile operations in both parts of the Turkish Empire. She was immediately joined by Roumania, who on May 22 (1877) declared her independence. The progress of the Russians was at first rapid; but the Turks offered an obstinate resistance. After the fall of Kars, however, November 18, and the fall of Plevna, December 10, the Turkish resistance completely collapsed, and on March 3, 1878, Turkey was compelled to agree to the treaty of San Stefano, in which she accepted the terms of Russia. The provisions of this treaty were, however, considerably modified by the Treaty of Berlin concluded on July 13 following by which Roumania, Servia, and Montenegro were declared independent; Roumanian Bessarabia was ceded to Russia; Austria was empowered to occupy Bosnia and Herzegovina; and Bulgaria was erected into a principality. See *Berlin, Treaty of*. The main events in the history of the Ottoman Empire from the Treaty of Berlin to the year 1890 were the French invasion of Tunis in 1881, which soon after was formally placed under the protectorate of the French; the treaty with Greece, executed under pressure of the great powers in 1881, by which Turkey ceded to Greece almost the whole of Thessaly and a strip of Epirus; the occupation of Egypt by Great Britain in 1882; the revolution at Philippopolis in 1885, when the government of Eastern Roumelia was overthrown, and the union of that province with Bulgaria proclaimed; the results of the revolution were recognized by an imperial firman in 1886, and Eastern Roumelia has since for all practical purposes formed part of Bulgaria. On Sept. 3, 1891, there was a change of grand viziers, which occasioned much excitement, as it was believed that a plot had been hatched for replacing the deposed Sultan, Murad, on the throne. The new grand vizier was Djevad Pasha, governor of Crete. It was also indicated by this change that the authorities were anxious to depart from the established policy of Kiamil Pasha, as exhibited in regard to the passage of the Dardanelles by Russian transport ships. The British protested against this and

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their naval force made a demonstration at Sigri, for which an explanation was demanded. In June, 1895, Djevad Pasha was succeeded by Said Pasha, and he in turn was replaced by Kiamil Pashi in October. Kiamil Pasha being appointed Vali of Aleppo, was succeeded by Kallil Rifaat Pasha. Constantinople was devastated by a great fire in July, 1890, the damage being estimated at \$5,000,000. Miss Anna Milton, of the Board of Presbyterian Foreign Missions, was viciously attacked at Nastoria, a village of Duore, in June, 1892. Shortly after, the house of Dr. Bartlett, an American missionary at Burdur, in Asia Minor, was burned to the ground. A full compensation for this outrage was made by the Porte. In July, 1894, Constantinople was visited by a series of earthquakes which lasted eight days, two or more occurring each day. Great damage was done to the city and surrounding country, and hundreds of people were killed. William S. Richard, the British consul, was killed in an attack made by the Bedouins on the various consulates at Jiddah, on May 30, 1895, for which the Turkish government was compelled by the powers to make prompt apology and reparation. The Turkish government has had numerous revolts to deal with during the last decade. Prominently among these were the Cretan affair; the Macedonian rising; the revolts in Arabia, Muscat, and among the Druses; and the Armenian troubles, which have caused much sympathy the world over, especially in America and Great Britain. The reason the powers have been unable to deal with these questions in a satisfactory manner is briefly this: An attack on Turkey would cause a general upheaval in Europe, which might result in an unsatisfactory distribution of Turkish territory; hence, diplomacy endeavors to avert the conflict.

Troubles began in Armenia when the Turkish government attempted to suppress the national movement to revive the ancient Armenian monarchy, and the desire of the natives to worship according to their custom. Oppressive measures were begun in 1888, when attacks were made on the Christians by the Kurds, Circassians, and Mussulmans. Two years later the Armenians were forbidden the right of meeting, even in their own churches. Again in 1893 robbery, riots, and other deeds of violence were perpetrated. The Evangelical School, an American institution in Mersivan, was destroyed. The American Missionary Society received full compensation from the Turkish government for this outrage. Some of the natives were killed and others banished. In February, 1894, occurred the "riot" in which the Turkish police at Yuzgat were overpowered after they had killed 30 and wounded 50 rioters. Further troubles arose from different immediate causes and riots were numerous, revolting tortures were practiced, the Turkish soldiers killed hundreds, churches were desecrated, villages were burned, infants were thrown into the river, and the commanding officers selected female slaves for their harems. It was esti-

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mated that nearly 5,000 Armenians were killed in these encounters, and about 3,000 were taken prisoners. The Armenians were greatly encouraged in Sept., 1895, when the British squadron which had been stationed at Salonica was moved to Lemnos, at the entrance of the Dardanelles. The death of Garabad in July, the attack on the American school at Tarsus in August, the murder of several Armenians as spies in Constantinople, and other deeds of violence were attributed to the Armenian "revolutionists." Eight hundred Armenians were killed by the Turks in a brutal outrage at Trebizond. The number of Armenians slaughtered during this month was nearly 9,000, and there was plenty of foundation for the belief which had gained considerable ground that the Sultan had tacitly sanctioned the extermination of the Armenians. It is believed that 2,500 Armenian villages were destroyed and half of the agricultural population homeless and starving. Permission was granted the powers to place a second vessel at Constantinople Dec. 10. About this time the Armenians became very aggressive and made numerous attacks on Turkish villages, and 20,000 Turkish troops were ordered to advance upon Zeitoun. The town was besieged and finally evacuated by the insurgents. In a battle between the Zeitounis and the Turks in January, 1896, the former were victors, but the Armenians surrendered in Feb., after an heroic defense.

In 1896, \$116,000 were distributed in relief work in Armenia by Clara Barton, president of the American Red Cross Society. Mahmond Pasha was appointed governor of Zeitoun April 15, 1896. This was contrary to an agreement that the governor of that place should be a Christian. The following details regarding the Armenian massacres were published by the American missionaries in April, 1896: 26,990 persons were in need; 6,029 houses were plundered; 1,861 houses were burned; 75 churches, chapels, etc., burned or damaged; 16 people forced to marry Turks; 2,300 rapes committed; 7,676 people converted by force; 1,315 people wounded; 829 miscarriages; 280 killed in field and highways; 56 persons burned; 1,014 died from hunger and cold; 23 committed suicide; 1,922 martyrs; 4,014 total deaths; and \$7,268,605 worth of property destroyed. These awful massacres continued at intervals through 1896 and 1897. At the present time very little trouble is reported from Armenia, and it is to be hoped that none of the cruelties will be repeated.

For an extended account of the war with Greece in 1897, in which Turkey was victorious, see *Greece*.

**Ottumwa**, Wapello co., Ia., on Des Moines River, 75 mi. w. by n. of Burlington. Railroads: C. B. & Q., and four other roads. It has extensive water power and is the great trade and manufacturing center of southern Iowa. Industries include iron works, rubber goods, machinery, cutlery, iron drills, boiler and stove works, cigar factories, and a large pork-packing establishment. It is the center

## Ounce

of the great Iowa coal fields. Population, 1900, 18,197.

**Oudh** (or Oude) (oud), a province of British India, bounded on the n. by Nergaul, and on other sides by the Northwest Provinces; area 24,246 sq. mi. Oudh is a vast alluvial plain, watered by the Gogra, Gumti, Kapti, and Ganges. It is for the most part highly fertile, and wheat, barley, rice, sugar, indigo, and others of the richest products of India, are raised in large quantities. Oudh, formerly a Mogul province, became subordinate to the British after the battle of Kalpee, in 1765. In 1856 complaints of the misgovernment of the king of Oudh led to the annexation of the country to the British dominions. This measure, however, produced much dissatisfaction, and when, in 1857, the mutiny broke out, most of the Oudh sepoys joined it, and the siege of Lucknow resulted. Since the pacification of 1858, schools and courts of justice have been established, and railways have been opened. In 1877 Oudh was partially amalgamated with the Northwest Provinces by the unification of the two offices of chief commissioner and lieutenant governor, but for most administrative purposes it remains a separate province. Lucknow is the capital, and the main center of population and manufactures. Pop. 11,387,741 (mostly Hindus).

**Oudh** (formerly Ayodhya), an ancient town in Faizabad district, Oudh, adjacent to Faizabad, on the river Gogra. In remote antiquity it was one of the largest and most magnificent of Indian cities, and is famous as the early home of Buddhism and its modern representative, Jainism. A great fair, attended by about 500,000 people, is held every year. Pop. 11,643.

**Oudinot** (ô-di-nô), CHARLES NICOLAS (1767-1847), duke of Reggio, peer and marshal of France. In 1804 Napoleon gave him the command of a grenadier corps of 10,000 men, which was to form the advance guard of the main army. At the head of these troops he performed many exploits, winning the battle especially of Ostrolenka, and deciding the fate of three great battles, Austerlitz, Friedland, and Wagram. After the last-named battle Napoleon made him a marshal and duke of Reggio, and gave him an estate worth \$20,000 a year. In the campaign of 1813 he was defeated at Grossbeeren and Dennewitz. In the campaign of 1814 he took an active part and was wounded for the twenty-third time. After Napoleon's abdication he gave in his adhesion to the Bourbons, to whom he ever afterward remained faithful, and who heaped upon him every honor.

**Ouida** (wē'da). See *Ramée, Louisa de la*.

**Oulless** (ou'les), WALTER WILLIAM, English painter, b. at St. Helier's, Jersey (1848). He studied at the Royal Academy, and began as a painter of *genre*, but has distinguished himself chiefly in portraiture. He was elected R. A. in 1881. Darwin, Newman, Lord Selborne, Sir Fred. Roberts, Cardinal Manning, Samuel Morley, M. P., and other celebrities have been among his sitters.

**Ounce** (Latin, *uncia*, a twelfth part of any



magnitude), in Troy weight is the twelfth part of a pound, and weighs 480 grains; in avoirdupois weight is the 16th part of a pound, and weighs 437½ grains Troy.

**Ounce**, one of the carnivora, found in Northern Africa, Arabia, Persia, India, and China. The length of the body is about 3½ ft., the tail measuring about 2 ft. It is a large cat, resembling the leopard and panther, but with a longer and more hairy tail and a thicker fur, somewhat less in size, and not so fierce and dangerous. In some places it is trained to hunt, like the cheetah.

**Ou'rebi**, an antelope of South Africa, found in great numbers in the open plains, and much hunted for its flesh. It is from 2 to 3 ft. high, of a pale dun color, and the male has sharp, strong, and deeply ringed horns.

**Ouro-Preto**, a town of Brazil, capital of the province of Minas-Geraes, 190 mi. n.n.w. of Rio de Janeiro. It was formerly one of the great mining centers of Brazil, but its gold mines are now nearly exhausted. Pop. 22,000.

**Ouse** (öz), a river of Yorkshire, England, formed by the junction of the Swale with the Ure near Boroughbridge; it flows southeast past York, Selby, and Goole, 8 mi. e. of which it unites with the Trent to form the estuary of the Humber. Its total course is 60 mi., for the last 45 of which (or to York) it is navigable.

**Ouse** (öz), GREAT, a river of England, rises near Brackley in the county of Northampton, flows in a general northeasterly direction, and falls into the Wash at King's Lynn, after a course of about 160 mi., for the latter two thirds of which it is navigable.

**Ouseley**, REV. SIR FREDERICK ARTHUR GORE, BART (1825-1889), English composer. He exhibited from childhood high musical ability, took the degree of Bachelor of Music at Oxford in 1850, and of Doctor in 1855, and the same year was appointed precentor of Hereford Cathedral. His works include treatises on *Harmony*, on *Counterpoint* and *Fugue*, and on *Musical Form* and general composition, and he wrote much church music.

**Outram** (ou'tram), LIEUTENANT GENERAL SIR JAMES (1803-1863), son of Benjamin Outram, was b. at Butterley Hall, Derbyshire, Eng. In 1828 he was selected to undertake a mission to the wild hill tribes of the Bombay presidency, a task in which he acquitted himself with credit. As adjutant to Lord Keane he took part in the Afghan War of 1839, and distinguished himself at the capture of Khelat, and by his dangerous ride disguised as a native devotee through the enemy's country to Kurrachee (1840). In 1856 he was nominated chief commissioner of Oudh. He was commander in chief of the British forces in the Persian War of 1856-57, and from Persia was summoned to India to aid in suppressing the mutiny. Although of higher rank than Havelock, whom he joined with reinforcements at Cawnpore in September, 1857, he fought under him till Lucknow was relieved by Sir Colin Campbell. In the following March he commanded the first division of infantry when Sir Colin finally regained possession of Lucknow. The shattered state of his health

compelled him to return to England in 1860; he d. at Pau and was buried in Westminster Abbey.

**Ouzel** (ou'zl), a genus of perching birds, included in the family of the thrushes. The American water ouzel or dipper inhabits the vicinity of streams in the Rocky Mountains from British America to Mexico. The common or ring ouzel is a European bird whose specific name is derived from the presence of a broad semilunar patch or stripe of white extending across its breast. Ouzel is also an older or poetical name for the blackbird.

**Ovam'pos**, a collection of black tribes of Southwest Africa, occupying the exceedingly fertile country which lies south of the Cunene River between 14° and 18° east lon., and north of Damara-land. These black tribes resemble the Kaffirs and Damaras in feature, and by many are supposed to be a connecting link between negroes and Kaffirs. Cattle forms the wealth of the Ovampo tribes, each of which has its own hereditary chief. They are also good agriculturists, and have made considerable progress in various arts.

**Oven Birds**, birds belonging to the family of Creepers, found in South America. They are all of small size, and feed upon seeds, fruits, and insects. Their popular name is derived from the form of their nest, which is dome-shaped, and built of tough clay or mud with a winding entrance.

**Ovens River**, a river in the northeast of the Australian colony of Victoria, a tributary of the Murray. The district is an important gold mining and agricultural one.

**Overijssel** (o'ver-i-sel) (or Overysse), a province of the Netherlands; area 1,283 sq. mi. Except a strip along the IJssel, presenting good arable and meadow land, the surface is mostly a sandy flat relieved by hillocks, and the principal industry is stock raising and dairy farming. Chief towns, Zwolle, Deventer, Almelo, and Kampen. Pop. 300,493.

**Overshot Wheel**, a wheel driven by water shot over from the top. The buckets of the wheel receive the water as nearly as possible, at the top, and retain it until they approach the lowest point of the descent. The water acts principally by its gravity, though some effect is of course due to the velocity with which it arrives.

**Ovid** (in full, PUBLIUS OVIDIUS NASO) (43 B. C.-18 A. D.), a celebrated Roman poet. He enjoyed a careful education, which was completed at Athens, where he gained a thorough knowledge of the Greek language. He afterward traveled in Asia and Sicily. He never entered the senate, although by birth entitled to that dignity, but filled one or two unimportant public offices. Till his fiftieth year he continued to reside at Rome, enjoying the friendship of a large circle of distinguished men. By an edict of Augustus, however (A. D. 8), he was commanded to leave Rome for Tomi, a town on the inhospitable shores of the Black Sea, near the mouths of the Danube. It is impossible now to come to any certain conclusion as to the cause of this banishment,

that given in the edict—the publication of the *Art of Love*—being merely a pretext, the poem having been in circulation ten years previously. The real cause may have been his intrigue with Julia, the clever but dissolute daughter of Augustus, whom he is supposed to have celebrated under the name of Corinna; or it may have been his complicity in the intrigue of Julia, the granddaughter of Augustus, with Silanus. The change from the luxurious life of a Roman gallant to that of an exile among barbarians whose very language was unknown to him must have been far from agreeable, and we find him addressing humble entreaties to the imperial court to shorten the term or change the place of banishment; but these entreaties, backed up by those of his friends in Rome, were of no avail; and Ovid d. at Tomi. He had been three times married. His works include *Amorum Libri III*, love elegies; *Epistolæ Herodii*, letters of heroines to their lovers or husbands; *Ars Amatoria*, *Art of Love*; *Remedia Amoris*, *Love Remedies*; *The Metamorphoses*, in fifteen books *Fasti*, a sort of poetical calendar; *Tristia*; *Epistolæ ex Ponto*, *Epistles from Pontus*; etc.

**Oviedo** (ō-vi-ā-dō), a town of Spain, capital of a province of same name, 230 mi. n.w. of Madrid. It was founded in 762, has a fourteenth-century cathedral and a university, and manufactures of hats, arms, napery, etc. Pop. 35,609. The province, area 4,080 sq. mi., pop. 596,856, is situated on the Bay of Biscay, and bounded by the provinces of Santander, Leon, and Lugo.

**Oviedo y Valdez** (ō-vi-ā-dō ē vâl-deth'), GONZALO FERNANDEZ DE (1478-1557), a Spanish historian, brought up as a page at the court of Ferdinand and Isabella. In 1514 he received a government appointment in the newly-discovered island of Hispaniola, and with few intervals spent the rest of his life there. Named by Charles V, historiographer of the Indies, he wrote his *Historia General y Natural de las Indias Occidentales*. This and his *Quinquagenas* are two works of great historical value. He d. at Valladolid.

**Ovum**, the "egg" or essential product of the female reproductive system, which, after impregnation by contact with the semen or essential fluid of the male, is capable of developing into a new and independent being.

**Owego**, Tioga co., N. Y., on Susquehanna River, 21 mi. w. of Binghamton. Railroads: Erie; D. L. & W.; and Lehigh Valley. Industries: wagon co., several flouring mills, iron foundry, harness factory, and the manufacture of grain drills. The village was first settled in 1785. Pop. 1900, 5,039.

**Owen**, SIR RICHARD (1804-1892), K. C. B., comparative anatomist and paleontologist, was b. at Lancaster, and educated at Lancaster Grammar School and the schools of Edinburgh, Paris, and London. Having settled in the metropolis he became assistant curator of the Hunterian Museum. In 1834 he was appointed professor of comparative anatomy at St. Bartholomew's Hospital; in 1835 professor in anatomy and physiology at the Royal Col-

lege of Surgeons, and in 1856 superintendent of the natural history department in the British Museum, from which last post he retired in 1883. Owen is acknowledged to be the greatest paleontologist since Cuvier, and as a comparative anatomist a worthy successor to Hunter. He was a voluminous writer on his special subjects, and an honorary fellow of nearly every learned society of America and Europe. Among his works are *Lectures on the Comparative Anatomy of the Invertebrate Animals*; *Lectures on the Comparative Anatomy of the Vertebrate Animals*; *History of British Fossil Mammals and Birds*.

**Owen, ROBERT** (1771-1858), an English social reformer. In 1899 he organized a company which bought the cotton mills at New Lanark. Owen as manager instituted a liberal and progressive policy towards his employees, which soon attracted wide attention. He believed that character is wholly the result of environment, and also was a believer in communism. He founded several unsuccessful communities based upon his ideas, among them one at New Harmony, Ind. Later he returned to England and became an ardent socialist and spiritualist.

**Owensboro**, county seat of Daviess co., Ky., 150 m. s. w. of Louisville; on the Ohio river, and on the L. & N. and the Louisv. St. L. & Texas railways. Industries: cellulose factory, planing and flour mills, foundries, distilleries, etc. The city contains a female college, and is an important shipping point for coal and tobacco. First settled in 1798. Pop. 1900, 13,189.

**Owen Sound**, Ontario, Canada, on the Canadian Pacific Railway. Pop. 7,497.

**Owl Parrot**, the type and only known representative of a peculiar group of the parrot family, is a large bird, a native of the South Pacific Islands, and especially of New Zealand. In aspect and in nocturnal habits it resembles the owl. It feeds on roots, which it digs out of the earth with its hooked beak. It seldom flies; it is generally to be seen resting in hollow stumps and logs, and is said to hibernate, every year attaining a greater development, in caves.

**Owls**, a group of birds forming a well-defined family which in itself represents the nocturnal section of the order of Raptores or Birds of Prey. The head is large and well covered with feathers, part of which are generally arranged around the eyes in circular discs, and in some species form horn-like tufts on the upper surface of the head. The beak is short, strongly curved, and hooked. The ears are generally of large size, prominent, and in many cases provided with a kind of fleshy valve or lid, and their sense of hearing is exceedingly acute. The eyes are very prominent and full, and project forward, the pupils being especially well developed—a structure enabling the owls to see well at dusk or in the dark. The plumage is of a soft downy character, rendering their flight almost noiseless. The tarsi are feathered, generally to the very base of the claws, but some forms, espe-

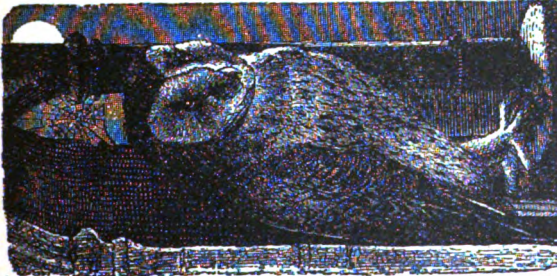




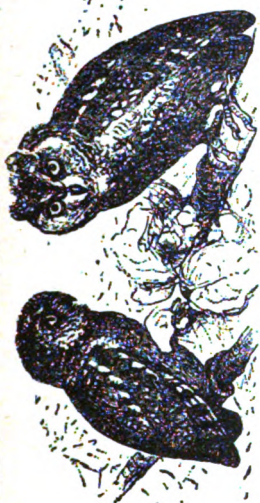
1. Large White Owl (*Nyctea nivya*).



4. Largest kind of Horned Owl (*Bubo maximus*).



2. Veiled Owl (*Sirix flammea*).



3. Horned Owl, or Bubo (*Asio scops*).



5. Tawny, or Wood Owl (*Syrnium aluco*).

6. Forest Owl (*Otus vulgaris*).



cially those of fish-catching habits, have the toes and even the tarsi bare. The toes are arranged three backward and three forward; but the outer toe can be turned backward at will, and the feet thus converted into hand-like or prehensile organs. In habits, most species of owls are nocturnal, flying about during the night, and preying upon the smaller quadrupeds, nocturnal insects, and upon the smaller birds. Mice in particular form a large part of their food. During the day they inhabit the crevices of rocks, the nooks and crannies of old or ruined buildings, or the hollows of trees; and in these situations the nests are constructed. They vary greatly in size, the smallest not being larger than a thrush. In their distribution the owls occur very generally over the habitable globe, both worlds possessing



Barn Owl.

typical representatives of the group. The common white or barn owl is the owl which has the greatest geographical range, inhabiting almost every country in the world. The tawny or brown owl is strictly a woodland bird, building its nest in holes of trees. The genus *Asio* contains the so-called horned owls, distinguished by elongated horn-like tufts of feathers on the head. The long-eared owl appears to be common to both America and Europe. It inhabits woods. The short-eared owl frequents heaths, moors, and the open country generally to the exclusion of woods. It has an enormous geographical range. The eagle owl occurs in Norway, Sweden, and Lapland, and over the continent of Europe to the Mediterranean. A similar species extends over the whole of North America. Owls of diurnal habits are the hawk owl and the snowy owl. The hawk mostly inhabits the Arctic regions, but migrates southward in winter, as does the snowy owl, which is remarkable for its large size and snowy plumage. The little owl, the bird of Pallas Athena, is spread throughout the greater part of Europe. One of the most remarkable of owls is the burrowing owl of America and the West Indies, which inhabits the burrows of the marmots or prairie-dogs.

**Owosso**, Shiawassee co., Mich., on Shiawassee River, 80 mi. n.w. of Detroit. Railroads: Michigan Central; Grand Trunk, D. & M. division; Ann Arbor, T. S. & M. Industries: carriage works, two iron foundries, furniture, casket, table and other factories, and car shops. Surrounding country agricultural. The

town was first settled in 1831, and became a city in 1859. Pop. 1900, 8,696.

**Ox**, the general name of certain well-known ruminant quadrupeds. The characters are: horns hollow, supported on a bony core, and curved outward in the form of crescents; there are eight incisor teeth in the under jaw, but none in the upper; there are no canines or dog teeth; the naked muffle is broad. The species are the common ox; the bison of Europe; the buffalo of North America; the buffalo of the eastern continent; the Cape buffalo; the yak of Thibet, etc. See *Bison*, *Buffalo*, *Yak*, etc. The common ox is one of the most valuable of our domestic animals. Its flesh is the principal article of animal food; and there is scarcely any part of the animal that is not useful to mankind; the skin, the horns, the bones, the blood, the hair, and the very refuse of all these, have their separate uses. Having been specially domesticated by man from a stock which it is probably impossible to trace, the result has been the formation of very many breeds, races, or permanent varieties, some of which are valued for their flesh and hides, some for the richness and abundance of their milk, while others are in great repute both for beef and milk. The ox is used in many parts of the world as a beast of draught. The name ox is used also in a more restricted sense to signify the male of the bovine genus castrated, and full grown, or nearly so. The young castrated male is called a *steer*. He is called an *ox-calf* or *bull-calf* until he is a year old, and a *steer* until he is four years old. The same animal not castrated is called a *bull*. There are several other varieties, as the Indian or zebu, with a hump on its back, the Abyssinian, Madagascar, and South African.

**Oxalic Acid**, an acid which occurs, combined sometimes with potassium or sodium, at other times with calcium, in wood sorrel and other plants; and also in the animal body, especially in urine, in urinary deposits, and in calculi. Many processes of oxidation of organic bodies produce this substance. Thus sugar, starch, cellulose, etc., yield oxalic acid when fused with caustic potash, or when treated with strong nitric acid. Sawdust is very much used for producing the acid. Oxalic acid is a solid substance, which crystallizes in four-sided prisms, the sides of which are alternately broad and narrow, and the summits dihedral. They are efflorescent in dry air, but attract a little humidity if it be damp. They are soluble in water, and their acidity is so great that, when dissolved in 3,600 times their weight of water, the solution reddens litmus paper, and is perceptibly acid to the taste. Oxalic acid is used chiefly as a discharging agent in certain styles of calico printing, for whitening leather, as in boot tops, and for removing ink and iron mold from wood and linen. It is a violent poison. *Oxalates* are compounds of oxalic acid with bases; one of them, binoxalate of potash, is well known as salts of sorrel or salts of lemon.

**Oxenstjerna**, AXEL COUNT (1583-1654), Swedish statesman, studied theology at Ros-

## Oxford

took, Wittenberg, and Jena; and in 1602, after visiting most of the German courts, returned to Sweden and entered the service of Charles IX. In 1608 he was admitted into the senate; and on the accession of Gustavus Adolphus, in 1611, he was made chancellor. He accompanied Gustavus Adolphus during his campaigns in Germany, taking charge of all diplomatic affairs; and on the fall of his master at Lützen (1632) he was recognized, at a congress assembled at Heilbronn, as the head of the Protestant League. This league was held together and supported solely by his influence and wisdom, and in 1636 he returned to Sweden after an absence of ten years, laid down his extraordinary powers, and took his seat in the senate as chancellor of the kingdom and one of the five guardians of the queen. In 1645 he assisted in the negotiations with Denmark at Bromsebro, and on his return was created count by Queen Christina, whose determination to abdicate the crown he strongly opposed.

**Oxford**, a city and county borough in England, capital of Oxford county, and seat of one of the most celebrated universities in the world, is situated about 50 mi. w.n.w. London, on a gentle acclivity between the Cherwell and the Thames, here called the Isis. The oldest building is the castle keep, built in the time of William the Conqueror and still all but entire. Of the university buildings the most remarkable are Christ's Church, the largest and grandest of all the colleges; Magdalen College, considered to be the most beautiful and complete of all; Baliol College; Brasenose College; and New College (more than 500 years old), largely consisting of the original buildings, and especially noted for its gardens and cloisters; the new examination schools, new museum, Bodleian Library, Radcliffe Library, and other buildings belonging to the university. Oxford depends mostly on the university, and on its attractions as a place of residence. Pop 45,741. The county is bounded by Northampton, Warwick, Gloucester, Berks, and Buckingham, area 483,621 acres. Pop. 185,938.

**Oxford University**, one of the two great English universities, established in the Middle Ages, and situated in the city of Oxford (which see). Like Cambridge it embraces a number of colleges forming distinct corporations, of which the oldest is believed to be University College, dating from 1253, though Merton College was the first to adopt the collegiate system proper. The following list contains the names of the colleges, in the order in which they were founded: University College, Baliol College, Merton College, Exeter College, Oriel College, Queen's College, New College, Lincoln College, All Souls' College, Magdalen College, Brasenose College, Corpus Christi College, Christ Church College, Trinity College, St. John's College, Jesus College, Wadham College, Pembroke College, Worcester College, Keble College, Hertford College. There are also two "Halls," St. Mary Hall and St. Edmund Hall, which are similar institutions, but differ from the colleges in not being corporate bodies.

## Oxford University

Oxford University is an institution of quite the same character as that of Cambridge. See *Cambridge, University of*. Most of the students belong to and reside in some college (or hall), but since 1869 a certain number have been admitted without belonging to any of these institutions. The students receive most of their instruction from tutors attached to the individual colleges, and those of each college dine together in the college hall and attend the college chapel. The ordinary students are called "commoners." The style or title by which the corporation is known is The Chancellor, Masters, and Scholars of the University of Oxford. The head of the university is the chancellor. The chief governing bodies are the House of Convocation, the Congregation of the University, and the Hebdomadal Council. The House of Convocation, which includes all doctors and masters whose names are on the register, elects to nearly all the offices in the gift of the university; gives the final sanction to all new statutes; transacts nearly all the formal business of the university as a corporate body; and elects the parliamentary representatives. The Congregation of the University, which includes professors and other officials and all resident members of Convocation, can amend, confirm, or reject legislative proposals laid before it, but all these must originate with the Hebdomadal Council, which consists of about twenty members, partly official, but mostly elected, and which meets every week in term time. The office of chancellor is almost purely honorary, the vice chancellor is in fact the supreme executive and judicial authority of the university. Two proctors are chosen yearly to maintain the discipline of the university. The university is open without respect of birth, age, or creed, to all who have passed the necessary examinations or other tests. Students enter as commoners or as "scholars" or "exhibitioners," according as they obtain some of the numerous scholarships or exhibitions which may be competed for. There are four terms or periods of study, known as Michaelmas, Hilary or Lent, Easter, and Trinity or Act. The two latter have no interval between them, so that the terms of residence are three of about eight weeks each. The degrees conferred are those of Bachelor and Master in arts, and Bachelor and Doctor in music, medicine, civil law, and divinity. Twelve terms of residence are required for the ordinary degree of B. A. No further residence is necessary for any degree, and no residence whatever is required for degrees in music. Candidates for the degree of B. A. must pass three distinct examinations: Responsions (known among undergraduates as the "Little Go" or "Smalls") before the masters of the schools; first public examination before the moderators ("Moderation"); and the second public examination before the public examiners ("Greats"). If the student wishes to take his degree with "honors" a residence of four years is usually necessary. Honors may be taken in *literæ humaniores* (classics, ancient history, and philosophy),

## Oxlip

mathematics, jurisprudence, modern history, theology, natural science, and Oriental studies. Any B.A. may proceed to the degree of M.A. without further examination or exercise, in the twenty-seventh term from his matriculation, provided he has kept his name on the books of some college or hall, or upon the register of unattached students for a period of twenty-six terms. In the case of all other degrees (except honorary ones) some examination or exercise is necessary. Women were admitted to the examinations in 1884, but do not receive degrees. Three colleges for women have been established: Somerville Hall, Lady Margaret Hall, and St. Hugh's Hall. Mansfield College, for the education of men for the nonconformist ministry, was established in 1888. The total number of students is about 3,000. The total number of professorships, etc., in the university is about fifty. The institutions connected with the university include, the Bodleian Library (the second in the kingdom), the Ashmolean Museum, Botanic Gardens, Taylor Institution for modern languages, University Museum, Radcliffe Library, Observatory, and Indian Institute. Affiliated colleges are, St. David's College, Lampeter (1880); University College, Nottingham (1882); and Firth College, Sheffield (1886). The university sends two members to Parliament.

**Oxlip**, a kind of primrose, so called from some resemblance in the flowers to the lirs of an ox, and intermediate between the primrose and cowslip.

**Oxus** (Amoo, Amoo-Daria, or Jihoon), a large river in Central Asia, which has its sources between the Thian Shan and Hindu Kush ranges in the elevated ranges known as the Pamir, flows w. through a broad valley, receiving many affluents, and n.w. through the deserts of Turkestan, to the southern extremity of the Sea of Aral, where it forms an extensive marshy delta. The principal head stream of the Oxus is by some considered to be the Panja River, which rises in a lake of the Great Pamir, at a height of 13,900 ft. The Oxus for a considerable distance forms the boundary between Afghanistan and Bokhara. Total course 1,300 mi.

**Oxygen**, a gas which is the most widely distributed of all the elements. Eight-ninths, by weight, of water, one-fourth of air, and about one-half of silica, chalk, and alumina consist of oxygen. It enters into the constitution of nearly all the important rocks and minerals; it exists in the tissues and blood of animals; without it we could not live, and by its agency disintegration of the animal frame is carried on after death. All processes of respiration are carried on through the agency of oxygen, all ordinary processes of burning and of producing light are possible only in the presence of this gas. Oxygen was first isolated in 1774 by Joseph Priestley who gave to the new gas which he had discovered the name of *dephlogisticated air*. Lavoisier, the year following Priestley's discovery, put forward the opinion that the new gas was identical with the substance which exists

## Oyer and Terminer

in common air and gave it the name of oxygen—from the Greek *oxys*, acid; and root *gen* to produce—because he supposed that it was present as the active constituent in all acids; modern experiments, however, prove that it is not necessary in all cases to acidity or combustion. Oxygen is invisible, inodorous, and tasteless; it is the least refractive, but the most magnetic of all the gases; it is rather heavier than air, having the specific gravity of 1.1056, referred to air as 1.00; it is soluble in water to the extent of about three volumes in 100 volumes of water at ordinary temperatures. Oxygen was liquefied for the first time in 1877 by the application of intense cold and pressure; it has even been solidified. It is possessed of very marked chemical activity, having a powerful attraction for most of the simple substances, the act of combining with which is called oxidation. Some substances when brought into contact with this gas unite with it so violently as to produce light and heat; in other cases oxidation is much more gradual, as in the rusting of metals. The presence of oxygen is, so far as we know, one of the physical conditions of life. In inspiring we receive into the lungs a supply of oxygen; this oxygen is carried by the blood to the various parts of the body, and there deposited to do its work of tissue forming, etc.; the deoxygenated blood returns to the lungs, and again receives a fresh supply of the necessary oxygen. Trees and plants evolve oxygen, which is formed by the decomposition of the carbonic acid absorbed by the leaves from the atmosphere. This is due to the action of the sun's rays and the chlorophyll or green coloring matter of the leaves. When oxygen unites with another element the product is called an *oxide*. The oxides form a most important series of chemical compounds. The power of supporting combustion is one of the leading features of oxygen, and until the discovery of oxygen no well-founded explanation of the facts of combustion was known. Oxygen exists in another form different from that of the ordinary gas; in this form it exhibits many marked peculiarities. See *Ozone*.

**Oxyhydrogen Light** (or Lime Light), a brilliant light produced when a jet of mixed oxygen and hydrogen gas is ignited and directed on a solid piece of lime. It is commonly used in magic lantern exhibitions; and the two gases are kept in separate air-tight bags, or iron cylinders into which the gas is forced under very high pressure. From these receptacles, tubes conduct the gases to meet in a common jet.

**Oxyrhynchus** (-rin'kus), a celebrated Egyptian fish, sacred to the goddess Athor, and represented in sculptures and on coins. It was anciently embalmed.

**Oyer and Terminer** (Law).—The name of courts of criminal jurisdiction in the U. S., generally held at the same time with the Court of Quarter Sessions, and by the same judges, and which have power, as the terms imply, *to hear and determine* all treasons, felonies, and misdemeanors committed within their juris-

## Oyster

diction. The terms Oyer and Terminer are derived from the Old French.

**Oyster**, an edible mollusk, and a near ally of the mussels, etc. It belongs to the genus *Ostraea*, family *Ostracidae*, the members of which are distinguished by the possession of an inequivalve shell, the one half or valve being larger than the other. The shell may be free, or attached to fixed objects, or may be simply imbedded in the mud. The foot is small and rudimentary, or may be wanting. A single (adductor) muscle for closing the shell is developed. The common oyster is the most familiar member of the genus. The fry or fertilized ova of the oyster are termed "spat," and enormous numbers of ova are produced by each individual from May or June to September—the spawning season. The spat being discharged, each embryo is found to consist of a little body inclosed within a minute but perfectly formed shell, and possessing vibratile filaments or cilia, by which the young animal at first swims freely about, and then attaches itself to some object. In about three years it attains its full growth. The oysters congregate together in their attached state to form large submarine tracts of "oyster beds," as they are termed. In America the beds of Maryland, of Virginia, of Georgia, and of Long Island, are celebrated; in Scotland the beds in the Firth of Forth; in France, those of Rochelle, Rochefort, Ré and Oléron, Cancale and Granville; in Denmark the Sleswick beds and those at the north point of Jutland. The most common American species is *O. virginiana*, which is found on the Atlantic coast from the Gulf of St. Lawrence to the Gulf of Mexico. The most favorable bottom and locality for oyster beds



a Diagram of Internal Structure.

The dorsal surface is downward, the anterior or head end to the left. a.—region where water enters and leaves the animal; the dark lines indicate where one mantle-flap has been cut away to expose the other structures; b.—gills; c.—margin of one of the mantle folds; d.—anterior part or hinge; e.—hood over mouth; f.—position of mouth; g, h.—labial palps; i.—end of intestine; l.—the closing muscle of shell; m.—position of the heart.

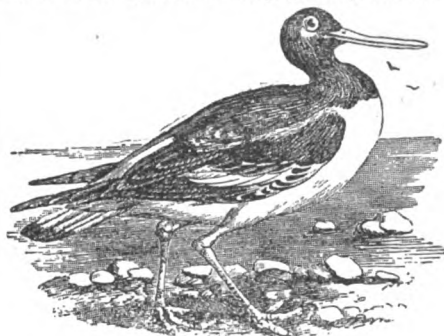
appear to be those situated in parts where the currents are not too strong, and where the sea bed is shelving, and covered by mud and gravel deposits.

The U. S. and France are the chief seats of the oyster industry. In the U. S. the oyster

## Ozone

beds are still a source of great wealth, while in Europe the native beds have long since been destroyed. Large quantities of American oysters are now sent to Europe; and the American are generally larger than the European. In Europe the oyster industry is rapidly ceasing to be oyster fishery and becoming oyster culture. The pearl oyster of the Indian and Pacific oceans belongs to a different family.

**Oyster Catcher**, a bird belonging to the order of Grallatores (or Wading Birds), nearly allied to the plovers, and popularly known as



Oyster Catcher.

the "sea-pie." It is distinguished by its long, thin, wedge-shaped, orange-colored bill, and its black and white plumage.

**Oza'ka**. See *Osaka*.

**Ozark Mountains**, a chain intersecting in a southwest direction the states of Missouri and Arkansas; height about 1,400 ft.

**Ozo'kerite**, a fossil resin of a pleasantly aromatic odor, existing in the bituminous sandstones of the coal measures, and occurring chiefly in Galicia, in Austria. It contains carbon and hydrogen in the proportion of 86 per cent. of the former to 14 per cent. of the latter. When purified it forms a hard paraffin, from which excellent candies are manufactured. It is used to some extent as an adulterant of beeswax.

**Ozone**, a modified — technically an *allotropic* — form of oxygen. Two volumes of ozone contain three volumes of oxygen condensed to two volumes. Ozone exists in small quantities in pure country air, and is produced in various ways. When an electric machine is set in operation a peculiar smell may be perceived; after a discharge of lightning the same smell is perceptible. The substance which manifests this odor is ozone (from Greek *ozō*, I smell), and in each of those cases ozone is produced. Ozone acts as a very powerful oxidizer; for this reason it is of great service in the atmosphere, as it so readily oxidizes, and thus renders comparatively un hurtful, animal effluvia and other obnoxious products of animal or vegetable decomposition. Ozone rapidly bleaches indigo, converting it into a white substance called isatin, which contains more oxygen than the indigo itself.



**Pachira**

**P**, the sixteenth letter and twelfth consonant in the English alphabet. It is one of the mutes and labials, and represents a sound produced by closely compressing the lips till the breath is collected, and then letting it issue.

**Pachira** (pa-kí'ra), a genus of tropical American trees allied to the baobab tree. The largest flowered species, *P. macrantha*, found in Brazil, attains a height of 100 ft., and has flowers 15 in. long. The plants are familiar in our hot-houses under the name of *Carolinea*.

**Pachuca** (pá-chō'ká), a town of Mexico, capital of the state Hidalgo, in a rich silver mining region, about 8,200 ft. above the sea. Pop. 14,265.

**Pacific Ocean** (formerly called also the *South Sea*), that immense expanse of water which extends between the North and South American continents and Asia and Australia. It is the largest of the oceans, exceeding in compass the whole of the four continents taken together, and occupying more than a fourth part of the earth's area, and fully one half of its water surface. On the west it extends to the Indian Ocean, and has several more or less distinct seas connected with it—the China Sea, Yellow Sea, Sea of Japan, Sea of Okhotsk, etc.; on the north it communicates with the Arctic Ocean by Bering's Straits, on the south it is bounded by the Antarctic Ocean, and on the east it joins the Atlantic at Cape Horn. Within this enormous circumference it includes the numerous islands composing the groups of Australasia and Polynesia, and those adjoining America and Asia. The average depth of the Pacific appears to be greater than that of the Atlantic, and its bed more uniform. Recent soundings to the south of the Friendly Islands give a depth of from 4,295 to 4,430 fathoms (about five miles). The deepest soundings known are 4,475 fathoms s. of the Ladrone Islands, and 4,655 fathoms n. e. of Japan. In the Pacific the tides never attain the maximum heights for which some parts of the Atlantic and Indian Oceans are celebrated. On all the west coast of America the rise of the tide is usually below 10 ft., and only in the Bay of Panama does it vary from 13 ft. to 15 ft. The trade winds of the Pacific are not so regular in their limits as those of the Atlantic, and this irregularity extends over a much wider region in the case of the southeast trade wind than in the case of the northeast. The cause of this is the greater number of islands in the South Pacific Ocean, which, especially in the hot season, disturb the uniformity of atmospheric pressure by local condensations. The northeast trade wind remains the whole year through within the northern hemisphere. The southeast trade wind, on the other hand, advances beyond the equator, both in summer and winter still preserving its original direction. In the region stretching

**Pacuvius**

from New Guinea and the Solomon Islands southeastward, there are no regular winds. The zones of the two trade winds are separated by regions of calms and light winds, the limits of which vary of course with the varying limits of these zones. In the Chinese seas the terrible typhoon occasionally rages, and may occur at any season of the year. The Portuguese were the first Europeans who entered the Pacific, which they did from the east. Balboa, in 1513, discovered it from the summit of the mountains which traverse the Isthmus of Darien. Magellan sailed across it from east to west in 1520-21. Drake, Tasman, Behring, Anson, Byron, Bougainville, Cook, Vancouver, Lapérouse, and others, traversed it in different directions in the seventeenth and eighteenth centuries.

**Pacific Railways.** Previous to 1850 the greater portion of the railroads made were in the states bordering on the Atlantic, and were for the most part isolated lines employed for local traffic. A great development to this form of enterprise was given by the discovery of gold in California, and lines were rapidly pushed toward the center of the continent. The great Civil War at the commencement of the next decade emphasized the necessity of direct communication with the growing Pacific states to cement the Union, and government assistance was freely given both in land-grants and money to the two companies, the Union Pacific and Central Pacific, which, building respectively from the east and the west, met near Salt Lake City in May, 1869, the total length from the Missouri River to San Francisco being 1,700 mi. Since that date five transcontinental lines have been completed, including the Canadian Pacific Railway on British territory, which was completed, according to arrangement with the Canadian government, by a syndicate of London, Paris, and American capitalists, being opened for general traffic in June, 1886. Commencing at Montreal, the line goes on to Ottawa, thence round the north of the Great Lakes to Port Arthur at the head of Lake Superior, and thence to Winnipeg, Manitoba, thence to Stephen in the Rocky Mountains, then across British Columbia to Vancouver on the Pacific. The length of the line from Montreal to Vancouver is 2,909 mi., without counting side extensions and leased lines.

**Packer, ASA** (1806-1879), capitalist and philanthropist, was b. in Groton, Conn. He was member of Pennsylvania Legislature, county judge, projector of the Lehigh Valley R. R. He became the richest man in Pennsylvania. He served two terms in Congress. Lehigh University was liberally endowed by him.

**Pacu'vius, MARCUS** (219-124 B.C.), ancient Roman tragic poet, b. at Brundisium, passed the greater part of his life at Rome, where he became famous both for his poetry and his



## Paddle Fish

paintings, retired to Tarentum during his last years, and d. at the age of ninety. Only fragments of his tragedies exist.

**Paddle Fish**, a large fish allied to the sturgeons, so named from the elongated broad snout with which it stirs up the soft muddy bottom in search of food. It often reaches a length of from 5 to 6 ft. The paddle fishes are exclusively North American in their distribution, being found in the Mississippi, Ohio, and other great rivers of this continent.

**Paderewski**, IGNACE JAN, b. in Poland in 1860. He received his musical education at Warsaw and Berlin and was made professor of music in the Conservatory of Music in Warsaw at the age of eighteen. At the age of twenty-four he was made professor in the Conservatory of Strasburg. Later he studied in Vienna and began professional tours. He has made four American tours, one in 1891, another in 1893, 1896 and 1899.

**Pad'ua**, a city in Italy, capital of the province of the same name, 22 mi. w. of Venice, on a low flat on the Bacchiglione, which flows through it in several branches and is crossed by numerous bridges. The houses are lofty, the streets narrow, and several of these, as well as some of the squares, are lined with mediæval arcades. Of recent times the town has been improved by the opening up of new and the widening of old streets. The buildings most deserving of notice are the town-house or Palazzo della Ragione; the large mosque-like church of St. Antonio; the church of the Annunziata; etc. The university was long renowned as the chief seat of law and medicine in Italy; and very many names famous in learning and art are connected with Padua, such as Galileo, Scaliger, Tasso, Giotto, Lippo Lippi, and Donatello. Under the Romans it was a flourishing municipal town, and its history follows the course of events common to most of the cities of Italy on the decline and fall of the Roman Empire. Latterly it was under the domination of Venice, whose fortunes it followed until 1866, when, with Venice, it became part of the kingdom of Italy. Pop. 47,334. The province of Padua has an area of 354 sq. mi., and pop. of 397,762.

**Paducah**, McCracken co., Ky., on Ohio River. Railroads: News & Miss. Val.; Pad. Penn. & Ala.; St. L., A. & T. H. Industries: railroad repair shops, saw and flour mills, foundries and machine shops, carriage factories, etc. Tobacco, corn, pork, iron, and other products are shipped largely. Pop. 1900, 19,446.

**Paez** (pá-eth'), JOSÉ ANTONIO (1790-1873), one of the founders of South American independence, b. of Indian parents near Acarigua, Venezuela, entered the patriot army in 1810, rose to general of division in 1819, and took a leading part in the battle of Carabobo, which secured the independence of Colombia in 1821. At first he acted in concert with Bolivar, but in 1829 he placed himself at the head of the revolution which culminated in the independence of Venezuela, of which he was the first president. He d. in exile at New York.

**Pagani'ni**, NICCOLÒ (1784-1840), a celebrated

## Paine

violinist, b. at Geneva. His first engagement was in 1805, at Lucca, where he found a patroness in Princess Eliza, Bonaparte's sister. In 1813 he left Lucca for Milan, and in 1828 visited Vienna. From this period his fame was world-wide. The wonder which he excited was caused not merely by the charm of his execution and his extraordinary skill, but also by his external appearance, which had something weird and even demoniacal in it.

**Page**, THOMAS NELSON, b. in Virginia in 1853. He was educated at Washington and Lee University, and the University of Virginia. Later he practised law in Richmond. He has written a number of books among which are *Marse Chan*, *In Old Virginia*, *Two Little Confederates*, *Befo' de War*, *Among the Camps*, *Unc' Edinburg*, *Red Rock*, etc.

**Paging Machine**, a machine for printing consecutive numbers on the pages of a book, bank notes and checks, railway tickets, etc. Several machines of this kind have been invented, all of which consist essentially of a number of revolving disks bearing the ten digits in raised figures on their circumference, with various contrivances for making the first disk describe one tenth of a revolution after every figure is printed, for making the second disk describe one tenth of a revolution every time the first makes a complete revolution, and so on, as well as for supplying the figures with ink at each impression. Provision is also made for the printing of duplicate and alternate numbers if this is required.

**Pago**, an Austrian island in the Adriatic, on the coast of Dalmatia; area 81 sq. mi.; pop. 5,781.

**Pago'da**, the name given to Hindu and Buddhist temples. The temple proper is generally of pyramidal form, and of a number of stories, of great size and height, and embellished with extraordinary splendor. Connected with it may be various other structures, open courts, etc., the whole forming architecturally a very imposing group. Pagodas are numerous not only in Hindustan, but also in Burmah, Siam, and China. The statues in the temples are often of a colossal size.

**Pahang'**, a state on the east coast of the Malay Peninsula; area 3,500 sq. mi.; pop. 20,000. By the treaty concluded between Great Britain and the sultan of Pahang in 1888 the control of the foreign relations of that state was conveyed to the government of the Straits Settlements; and Pahang is now practically a dependency of that colony.

**Paine**, ROBERT TREAT (1731-1814), signer of the Declaration of Independence, was b. in Boston, Mass. He was delegate to Provincial and Continental Congresses. He held offices of attorney general of Massachusetts and Judge of Supreme Court; was an able judge.

**Paine**, THOMAS (1737-1809), political and deistical writer, b. at Thetford, England. In 1774 emigrated to America, with a letter from Franklin. Paine threw himself heart and soul into the cause of the colonists, and his pamphlet entitled *Common Sense*, written to recom-

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mend the separation of the colonies from Great Britain, and his subsequent periodical called the *Crisis*, gave him a title to be considered one of the founders of American independence. In 1787 he returned to England, and in answer to Burke's *Reflections on the French Revolution* wrote his *Rights of Man*. A prosecution was commenced against him as the author of that work, but while the trial was pending he was chosen member of the national convention for the department of Calais, and, making his escape, set off for France, where his *Rights of Man* had gained him great popularity, and arrived there in September, 1792. On the trial of Louis XVI he voted against the sentence of death, proposing his imprisonment during the war and his banishment afterward. This conduct offended the Jacobins, and toward the close of 1793 he was excluded from the convention, arrested, and committed to prison, where he lay for ten months, escaping the guillotine by an accident. Just before his confinement he had finished the first part of his work against revelation, entitled the *Age of Reason*; it was published in London and Paris in 1794, by which step he forfeited the countenance of the greater part of his American connections. He remained in France till August, 1802, when he embarked for America, where he spent the remainder of his life, occupied with financial questions and mechanical inventions. He died at New York.

**Painting** is the art of representing the external facts of and objects in nature by means of color. A study of the art requires a knowledge of form, animate and inanimate; of perspective; and of light and shade. Considered in relation to the subjects treated, painting may be divided into decorative, historical, portrait, *genre* (scenes of common or domestic life), landscape with seascape, architectural, still life. According to the methods employed in the practise of the art it is termed oil, water color, fresco, tempera or distemper, and enamel painting, and in mosaics, on glass, porcelain, terra cotta, and ivory (this last being called miniature painting). Decorative works, usually in fresco or tempera, but sometimes in oil, are generally executed upon the parts of a building. For the basis of easel pictures, wood panels prepared with a coating of size and white were used solely up to the fourteenth century for both oil and tempera, and are still sparingly employed; but canvas covered with a priming of size and white lead, and tightly nailed over a wooden frame called a "stretcher," is now almost universally adopted for oil painting. For water colors paper alone is employed. The tools used by an artist are charcoal, colored crayons, and lead pencils for outline purposes; colors, a palette for holding the same, a palette knife for mixing them; brushes for laying them on; and an easel with adjustable heights for holding the canvass. A wooden manikin, with movable joints, and termed a "lay figure," is sometimes used on which to arrange costumes and draperies.

The term "oil colors" is employed to denominate colors ground with oil, and water colors

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those wherein gum and glycerine have been employed. Both are ground solid, an oil medium being used in the first case and water in the second to thin out the colors when on the palette. Fresco painting is executed on wet plaster. Mosaic work is formed by small cubes of colored glass, called tesserae, fixed in cement; in tempera the colors are mixed with white; in encaustic, wax is the medium employed; and in enamel the colors are fired. Egyptian, Greek, and early Roman paintings were executed in tempera; Byzantine art found its chief expression in mosaics, though tempera panels were executed; and early Christian art up to and partly including the fourteenth century adopted this last method. The vehicle employed in mixing the colors was a mixture of gum and white of egg, or the expressed juice of fig tree shoots. The introduction of oil painting was long attributed to the Van Eycks of Bruges (1380-1441), but painting in oil is known to have been practised at a much earlier period, and it is now generally held that the invention of the Van Eycks was the discovery of a drying vehicle with which to mix or thin their colors, in place of the slow drying oil previously in use. This new vehicle was composed of a thickened linseed oil mixed with a resinous varnish, and it was its introduction that effected so great a revolution in the art of painting.

**History—Egypt and Greece.**—The practise of painting extends back to remote ages. It comes first into notice among the Egyptians in the nineteenth century B.C., the most flourishing period being between 1400 B.C. and 525 B.C. With them the art was the offspring of religion, and was with sculpture, from which it cannot be separated, subordinate to architecture. The productions are found chiefly on the walls of tombs and temples, but also on mummy cases and rolls of papyrus. They consist chiefly of the representation of public events, sacrificial observances, and the affairs of everyday life. The work is purely conventional in character, and was executed according to a strict canon of rules under the supervision of the priesthood. Both outline and color were arbitrarily fixed, the figures and objects being rendered in profile and painted in perfectly pure flat tints, with no light or shade. The colors used are very simple, but the effect is often very harmonious, and with a strong sense of decorative composition. Although art is the natural product of man's mind, and cannot be assigned any particular commencement, it is nevertheless doubtless that Egyptian art slightly influenced that of Asia Minor, and strongly so that of Greece, in which country the arts attained to the highest excellence. This is proved by the testimony of historians, for no specimens of true Greek painting save those on vases, have come down to us. In Greece, as in Egypt, painting with sculpture were the handmaidens of architecture, the friezes, pediments, and statues of the temples being originally colored. The more celebrated of the Greek schools of painting were at Ægina, Sicily, Corinth, and Athens; the chief mas-



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ters being Cimon, Polygnotus, and Pausanias, who lived about the fifth century B. C. Apollodorus, same century, systematized a knowledge of light and shade, while Zeuxis and Parrhasius directed their efforts to the perfecting of an ideal human form. Timanthes, a tragic painter, lived in the next generation; and at the time of Alexander the Great appeared Apelles (350 B.C.), the greatest of all Greek portrait painters, and Protogenes, an animal painter. With the death of these two painters decline set in, and Greek art gave itself up to the pursuit of trifling and unworthy subjects. Greek painting seems to have been, in truth of effect and in light and shade, in no way inferior to work of the present day, although perspective as a science does not seem to have been practised.

Rome never had in ancient times an art that was indigenous, or produced a painter worthy of note. The conquest of Greece by the Romans brought an influx of Greek artists into Italy, and it was with their hands that the principal works of Roman art were produced. A number of specimens of ancient paintings have been discovered in the tombs and baths of Rome, at Pompeii, and at other places in Italy, chiefly in fresco and mosaic. Judging from these remains, which are known to have been produced when art was in a state of decadence, the ancients would seem to have possessed a great knowledge of the human figure, of animals, and of inanimate nature, and of their uses in art. Their skill as decorators has scarcely been surpassed. Their colors were used pure with a just treatment of light and shade, and the knowledge of perspective shown, is true, but limited in extent. During the first three centuries after Christ, painting under the new influence of Christianity was practised secretly in the catacombs under and around Rome. But with the establishment of Christianity by Constantine as the religion of the state, pagan art received its death-blow. Christian art was permitted to emerge, and was allowed to adorn its own churches in its own way. Mosaics, missal paintings, and a few panels are all that are left to us of this period. Notwithstanding the efforts made by several of the popes to encourage its growth by withdrawing certain limitations, especially as regards the use of the human figure, art sank lower and lower, until with the flood of barbarism which in the seventh century buried Italian civilization, the art of Christian Rome was practically extinguished.

*Byzantium.*—Meanwhile with the foundation of Byzantium by Constantine in 330 A.D., a Byzantine school of art had been steadily growing up. As to style, it manifested the old Greek ideals modified by Christianity, and had reached its highest point about the time that Roman art was at its lowest. At Byzantium, art had become Christian sooner and more entirely than at Rome. Like the art of ancient Egypt, however, it had grown, under the strict influence of the priesthood, mechanical and conventional, but was yet strong enough to send artists and teachers through Southern

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Europe. Their works are still to be seen at Ravenna, in Rome, in Palermo, and more especially in the church of St. Mark at Venice. All the Byzantine decorations are in mosaic, and are noteworthy for the splendor of their gilded backgrounds and for their grandeur of conception, though the figure drawing is weak, with no attempt at pure beauty. The Byzantine school was thus the immediate parent of the great schools of Italy, and of the Rhenish or old Cologne school in Germany.

*Italy, Early Period.*—The Italian painters could not, however, at once free themselves from the Byzantine tradition which compelled one painter to follow in the steps of his predecessor without referring to nature; and so this style was carried on in Italy by Byzantine artists and their Italian imitators up to the middle of the thirteenth century. The breaking through of this tradition and the great progress made by the arts in the thirteenth century, form part of a movement which has been termed the Renaissance or Revival, the arts being no longer representative merely, as heretofore, but becoming imitative.

Three cities of Italy, namely, Siena, Pisa, and Florence, share the honors of this revival, each boasting a school, and each possessing two or three great names and their consequent followers. The first regenerators were Guido of Siena, Giunta of Pisa, and Margaritone of Arezzo, whose works, though ugly and almost barbarous, yet show a departure from the stiffness of Byzantine tradition. Giovanni Cimabue, b. at Florence in 1240, may, however, be said to be the father of modern painting, and was the first to fairly free himself from traditional models; his works and those of his predecessors just named forming the transition from the Byzantine to the modern manner. His appearance marks an era in history, and after him come two painters, the one at Siena and the other at Florence, in each of whom appears the power of deriving an impression direct from nature. These were Duccio di Buoninsegna (1260-1320), whose masterpiece is still at Siena, and Giotto (1266-1337), a pupil and protégé of Cimabue, and of whose works examples are still to be seen in Florence, at Assisi, and at Padua. Of these two Giotto is by far the greater, and his immediate pupils and their successors constituted a school which exercised an influence throughout Italy. The rival school of Siena produced Simone Memmi (1284-1344), but died out owing to its exclusiveness. The works of all the artists of these two schools were executed either in fresco or in tempera, and although lacking in chiaroscuro and deficient in perspective, compensated largely for these defects by an earnestness, a devotion, and a spiritual significance which will forever make the fourteenth century memorable in the history of art. No other schools worthy of note existed elsewhere in Italy during this century, neither could the Flemish nor the German school be said to have had any distinct existence as such.

With the fifteenth century came the introduction of oil painting, and with it an all-round

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improvement both in knowledge of technics and power of expression. To the earlier half of this century belong the great masters of religious art, the most noteworthy being Fra Angelico (1387-1455), who worked chiefly in Florence, and whose productions are full of the peculiar religious fervor characteristic of the painter. A knowledge of the exact sciences as applied to art gave an added impulse, and Paolo Uccelli (1396-1475) and Piero della Francesca (1415-92) divide the honor belonging to the perfecting of a system of perspective. The works of Masolino da Panicale (d. 1420) show the greatest advance yet made in the direction of chiaroscuro. Masaccio (1401-28), by his knowledge of the figure and by his treatment of groups with their proper force of light and shade and relief in appropriate surroundings, became the founder of the modern style. Andrea Verrochio (1432-88), the master of Leonardo da Vinci, promoted a knowledge of anatomy, and Ghirlandajo (1449-98), the master of Michael Angelo, may also be mentioned, both as goldsmith and as painter. These painters all belong to the Florentine school, but other schools were co-existent, notably that of Padua founded by Squarcione (1394-1474), whose pupil was Andrea Mantegna (1431-1506), an artist who takes rank among the greatest masters of painting. The Venetian school also arose under the influence of Bellini, Giovanni (1427-1516) and his brother Gentile (1429-1507), whose works, though somewhat hard and somewhat dry in texture, yet in color anticipate the great works of their pupils. The Umbrian school produced Pietro Perugino (1446-1524), a painter of the first rank and the master of Raphael. The Neapolitan school also began to be heard of. The Italian art work of the fifteenth century by its unconscious and spiritual meaning excelled much of that which was to follow. The latter, though carried to the highest pitch of perfection, lost much of the freshness and spontaneity possessed by the art of the earlier century.

*Netherlands, Early Period.*—Before speaking of the sixteenth century it were well to look elsewhere in Europe, and especially at the Netherlands, from whence had come the invention in oil painting, which so completely revolutionized technical methods. The discovery was made by the brothers Hubert and Jan Van Eyck of Bruges about the commencement of the fifteenth century, and carried to Italy by Antonello da Messina (1445-93). The greatest follower of this school was Hans Memling (1450-99), a comparison of whose works with those of his Italian contemporaries shows an excellence of technic and a power of expression not always in favor of the Southern artists.

*Italy, Germany, Sixteenth Century.*—The work of the sixteenth century is centered as much upon particular men as upon schools. Though many of the painters hereafter named were born in the latter half of the fifteenth century, their work separates itself so distinctly from that of their predecessors that it is the custom to consider it as belonging to the latter period.

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The four great schools were at Florence, Rome, Parma, and Venice, and each furnished from its scholars a painter who was in himself the particular glory of his school. Heading the Florentine comes Leonardo da Vinci (1452-1519), who established himself at Milan, and was celebrated as a painter, sculptor, architect, and engineer, his chief pupil being Bernardino Luini (1470-1530). Then followed no man's style, but coming as a creator, we have Michael Angelo (1475-1564), combining in himself the highest powers in architecture, sculpture, and painting. He was followed in Florence by Fra Bartolommeo (1475-1517) and Andrea del Sarto (1488-1531). The Roman school, not indigenous, but a continuation of the Umbrian school before mentioned, centers itself round the third great name, that of Raphael Sanzio (1483-1520), aptly called the prince of painters, who with his pupils and assistants, the chief among them being Giulio Romano, constitute the Roman school. Parma contains the work of Correggio (1494-1534), generally known as the head of the Lombard school, an artist unrivaled for grace, and harmony of chiaroscuro. Lastly, Venice produced a school supreme in respect of color, and owing such power as it possesses entirely to the influence of the Bellini. The first name in this period is Giorgione (1476-1511); then comes Titian (1477-1576), who takes rank with the great masters of the Florentine and Roman schools; followed by Tintoretto (1512-94) and Paolo Veronese (1532-88), who with Titian stand for all that is greatest in this school. In the North the Flemish school had become rapidly Italianized, with a result best seen in the following century. In Germany the influence of the Flemish school had made itself felt, and had produced in Albert Dürer of Nuremberg (1471-1528) the most celebrated master of his time north of the Alps.

*Italy, Germany, etc., Seventeenth Century.*—The sixteenth century consummates the great age of modern art, an age that might justly be said to equal any period of Greek art. With the seventeenth century came the decline, brought about chiefly by the slavish imitation of the great painters of the preceding period, and art was only saved from extinction by a reaction headed by the Caracci. Their school, known as the Eclectic, was founded at Bologna by Ludovico (1555-1619), Agostino (1557-1607), and Annibale (1560-1609). Their principle was to unite a direct study of nature with a study of the excellencies of the great masters. To a certain extent the object was attained, and Guido Reni (1574-1642), Albani (1578-1660), and Domenichino (1581-1641), best illustrate in their works the results arrived at. Side by side with this school grew up that of the Naturalists at Naples founded by Caravaggio (1569-1609). Pietro da Cortona (1596-1669), the last of the Roman school, was the opponent of the Eclectic style. With the later Venetian school, which count Canaletto (1697-1768) and Tiepolo (1693-1770) among its disciples, the art of Italy may be said to have ended. Its seed spread itself and took root in France, and especially

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in Flanders, where Rubens (1577-1640) had become its greatest exponent. In Holland, however, art had acquired a distinct individuality, first in Franz Hals (1584-1642), and above all in its typical painter Rembrandt (1607-69), both portrait painters distinguished for their portrait groups; also by its landscape and *genre* painters, of which two classes of subjects this school is the great exponent. Among its landscape painters are Van de Velde, Ruysdael, Hobbema, and Cuyp; and among its *genre* painters are Gerard Dow, Breughel, Teniers, and Van Ostade. The Spanish school, which stands alone in the prevailing religious ascetic character of its productions, and which in the preceding centuries had been influenced by Flemish and Italian painters, reached its greatest epoch in this century with Velasquez (1599-1660), one of the greatest of portrait painters, and Murillo (1613-80).

*France, Sixteenth to Nineteenth Century.*—The effect of Italian art in France remains to be noted. The school of France, influenced at first both by Flemish and by Italian art, finally inclined to the latter, and in the reign of Francis I (1515-47) a school was established at Fontainebleau and called by that name. Leonardo da Vinci worked in France, and Primaticcio carried on the unfinished work of Rosso (d. 1541). Jean Cousin (1501-89) may be called the founder of the French school as opposed to the Italianized version which began with Simon Vouet (1590-1649). The native school was, however, finally overcome by the Italian method. Nicholas Poussin (1594-1665), figure and landscape painter, one of the greatest painters France can claim; Claude Lorraine (1600-82) and Gaspar Dughet or Poussin (1613-75), landscapists, are painters who, though born in France, yet worked in Italy, and stand apart from the followers of the then national style; as does also Eustache Lesueur (1617-55), sometimes called the French Raphael. This national style was coeval with the court of Louis XIV and representative of it, the chief exponents being Le Brun (1619-90), Mignard (1610-96), Du Fresnoy (1611-65), and Jouvenet (1644-1711). To continue the history into the eighteenth century, with France we find a steady deterioration both in technic and morality; the latter phase commenced by Watteau and Lancret, two painters truly French, and consummated by Boucher (1704-70). Greuze (1725-1805) and Vien (1716-1809) were the first to protest against the corrupt influence of Boucher, and were the precursors of the reform, of which David (1748-1825) was the great instigator, a man whose influence made itself felt throughout Europe. He insisted upon a return to the study of the antique, and his followers number a few distinguished men, notably Gros and Guerin. Géricault (1774-1829), a pupil of Guerin, was the first to break with the extreme classicism of the school of David, and Ingres (1780-1867), Delacroix (1798-1863), Scheffer (1795-1858), and Delaroche, noted for the reality of his historical subjects and the tenderness and pathos of his sacred pictures (1797-1856), are the most distinguished names of the more

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direct and romantic style initiated by him. Modern French landscape art, founded upon an impulse received from England, has had Decamps (1803-66), Rousseau (1812-67), Corot (1796-1875), and Millet (1815-75), as its chief exponents. The work of Regnault (1843-71) remarkably illustrates the tendencies of modern French painting. Bastien-Lepage (1848-84), with his literal renderings of nature, strongly influences the younger British school; and Meissonier, Gerome, Bougereau, Constans, and Cabanel, and Puvis de Chavannes as a decorative artist, are some of the chief members of a school which is at the present time influencing the art of the world.

*Germany, Holland, etc., Nineteenth Century.*—Germany during the eighteenth century remained stationary in matters of art, but with the revival in France came a similar but slightly later movement in Germany, the precursors of which were Holzer (1709-40), a Tyrolean fresco painter, and Carstens (1754-98). The chief of the revivalists, however, was Overbeck (1789-1869), who, with a band of followers, founded a school at Rome in 1810, the principle animating whose work was that modern artists should only study the painters of the time preceding Raphael. Overbeck painted religious subjects, and worked both in fresco and oil. His works while possessing fine feeling are poor in color and weak in chiaroscuro. Chief among his pupils is Cornelius (1783-1867), one of the greatest of modern German painters, and whose work is best seen in Munich. Schadow (1789-1862) was a pupil of Cornelius. Schnorr von Carolsfeld (1794-1872) chose for his subjects the mediæval history and myths of Germany, and also produced an extensive series of illustrations of the Bible of great merit. Kaulbach (1805-1874), a great historical painter and pupil of Cornelius, shows in his work some of the worst faults of the modern German school. Lessing (1808-1880) is famous both for his historic and landscape pictures, and among living painters worthy of note are Gabriel Max, and Menzel in historic, Knaus Vautier, Metzler, and Bochmann, in genre, and Achenbach in landscape. In Dutch art of the present day the same taste but not the same power of execution prevails as in earlier times. Sea-pieces, landscapes, scenes of common life are still the chief subjects selected. Schotel and Scholffhart have distinguished themselves as landscape painters, Van Os, Van Stry, and Ommeganck as cattle and figure painters, while Josef Israels a painter of domestic scenes, with M. Maris and Mesdag are living artists. The influence of the French school is at present paramount in Belgium, as was the classicism introduced by David up to 1830. At that time a reaction was begun by Leys (1815-69), and followed up by Wappers (1803-74), painters who selected historical subjects of national interest. The work of reformation continued to be carried on notably by Gallait and De Keyser; while the strong current of the present French influence may be seen in the works of the living artists Alfred Stevens and Verlat. In Italy after a long



period of artificialness and mediocrity there are signs of a revival in painting. Pio Joris and Cammarano have gained distinction as painters of history, and Alberto dall'Oro and Pallizzi as painters of landscape. Morbelli and Segantini show in their works some signs of a return to nature. Spain, too, with the exception of the works of Fortuny, remains unindividualistic; but a strong influence is now being exercised upon her by French art. Russian art remained at a standstill after the Byzantine period, but has since 1850 made great advances. It has produced Swedomsky, historical painter, Verestchagin, a traveler artist, and Kramskoë, a religious painter. Scandinavian art inclined for some time to the two schools of Düsseldorf and Paris, but has finally elected to follow the latter, several of her younger artists residing permanently there. Their choice is usually landscape, and among the chief names may be mentioned Normann Uhde and Edelfeldt. Until about 1825 the U. S. had followed Great Britain in art as in literature. Since that time, however, a marked development of individuality and excellence has been apparent, as is shown by the following statement. At the French exposition, the most famous and exclusive of art exhibitions, in 1855 there was no American section; in 1868 a part of a small section was allotted to the U. S.; in 1878 it had a large exhibit, and in 1900 it furnished the largest exhibit except France, and received more honors than any other nation except France. Most American painters complete their education abroad, particularly in France; but there are an increasing number of good art schools in the U. S., and with the excellent instruction offered in the public schools, they are rapidly cultivating an appreciation of the best in art. Of American painters the following are probably the best known: West, Copley, Stuart, Allston, Bierstadt, Church, Inness, La Farge, Sargent, Vedder, Whistler and Moran.

**Paisley**, a municipal and parliamentary burgh of Scotland, in the county of Renfrew, on the White Cart. The most noteworthy building is the Abbey Church. Others are the new county buildings, the old county buildings and prison, the townhall, the Neilson educational institution, etc. Paisley has been long noted for its manufactures of textile goods. The shawl manufacture, introduced about the beginning of the present century, and long a flourishing industry, is not now a staple, but the textile manufacture is still large, and to it has been added that of sewing cotton. Among the other manufactures are tapestry, embroidery, tartans, and carpets. There are also dye and print works, engineering works, soap works, manufactories of starch, corn flour, mustard, and chemicals; distilleries, breweries, and shipbuilding yards, chiefly for river steamers and dredgers.

**Pal'adin**, a term originally applied to the *Comes palatii*, Count of the Palace, or Count Palatine, the official who superintended the household of the Carolingian sovereigns, and

then to the companions in arms of Charlemagne, who belonged to his court. Latterly it was used in a more general sense.

**Palæog'raphy** (Gr. *palaios*, ancient, and *graphê*, writing), is the science by means of which ancient inscriptions, and the writings and figures on ancient monuments, are deciphered and explained; as distinguished from *diplomacy*, which deals with written documents.

**Palæontol'ogy** is the science which treats of the living beings, whether animal or vegetable, that have inhabited the globe in the successive periods of its past history. The comparison of the fossil remains of plants and animals, belonging for the most part to extinct species, has given a powerful impulse to the science of comparative anatomy, and through it a truer insight has been obtained into the natural arrangement and subdivision of the classes of animals. But the science which has profited in the highest degree from palæontology is geology. Palæontology, apart from its importance as treating of the past life history of the earth, assists the geologist in his determination of the chronological succession of the materials composing the earth's crust. *Palæozoic*, or ancient life epoch, which includes the Laurentian, Cambrian, Silurian, Devonian, Old Red Sandstone, Carboniferous, and Permian rock systems. *Mesozoic*, or middle life epoch, including the Triassic, Jurassic or Oolitic, and Cretaceous rock systems. *Cainozoic*, or recent life epoch, which comprises the Eocene, Miocene, Pliocene, and Post-tertiary rock systems. The fossil remains of the first two divisions mostly belong to extinct species. The Cainozoic fossils belong mostly to living species or species only recently extinct.

**Palais Royal** (pâ-lâ-rwâ-âl), a popular resort of the Parisians, originally a royal palace as the name implies. The original palace was built (1629-36) by Richelieu, and by him presented to Louis XIII. It was confiscated by the Republicans in 1793, and the Tribunal sat in the palace during the Reign of Terror. At the Restoration it was repurchased by the Duke of Orleans, but in the revolution of 1848 it was again appropriated to the state. In 1871 it was set on fire by the Communists, but has since been restored. The Théâtre Français and several shops now form parts of the buildings of the Palais Royal.

**Palanquin** (Palankeen) (pal-an-kēn'), a covered conveyance used in India, China, etc., borne by poles on the shoulders of men, and in which a single person is carried from place to place. The palanquin proper is a sort of box about 8 ft. long, 4 ft. wide, and as much in height, with wooden shutters on the venetian-blind principle. It used to be a very common conveyance in India, especially among the Europeans, but the introduction of railways and the improvement of the roads have almost caused its discontinuance.

**Pal'ate**, the name applied to the roof of the mouth. It consists of two portions, the *hard* palate in front, the *soft* palate behind. The former is bounded above by the palatal bones, in front and at the sides by the alveolar arches



## Palatinate

and gums being lined by mucous membrane; behind, it is continuous with the soft palate. It supports the tongue in eating, speaking, and swallowing. The *soft palate* is a movable fold suspended from the posterior border of the hard palate. It consists of mucous membranes, nerves and muscles, and forms a sort of partition between the mouth and hinder nostrils. Its upper border is attached to the posterior margin of the hard palate; its lower border is free. The *uvula* hangs from the middle of its lower border, and on each side are two curved folds of mucous membrane called the *arches* or *pillars* of the *soft palate*. Between these on either side of the pharynx are the two glandular bodies known as *tonsils*. The upper surface of the soft palate is convex, the lower surface is concave with a median ridge, the latter pointing to the early or embryo stage of its formation when it consists of two distinct parts. Non-union of these halves and of those of the hard palate constitutes the deformity known as *cleft palate*, often associated with hare-lip. Glands are abundant in the soft palate, secreting the mucus which lubricates the throat during the passage of food. The soft palate comes into action in swallowing, and in speaking, being of great importance in the utterance of certain sounds. The special use of the uvula is not well known. It is often relaxed or enlarged, causing troublesome cough.

**Palatinate** (German Pfalz), a division of the old German Empire, under the rule of counts palatine (Pfalzgrafen), consisting of two separate portions distinguished as the Upper and Lower Palatinate. The Upper or Bavarian Palatinate was bounded mainly by Bohemia and Bavaria, and its capital was Amberg. The Lower or Rhenish Palatinate lay on both sides of the Rhine, surrounded by Baden, Alsace, Lorraine, etc., its chief towns being Heidelberg and Mannheim. The counts palatine were in possession of the Palatinate and the districts belonging to it as early as the eleventh century, and were long among the most powerful princes of the German Empire. At the Peace of Westphalia (1648) the Lower Palatinate was separated from the Upper, Bavaria getting the latter, while the former now became a separate electorate of the empire, and was henceforth generally known as *the Palatinate*. By the treaties of Paris (1814-15) the Palatinate was split up; Bavaria received the largest part, and the remainder was divided between Hesse-Darmstadt and Prussia. The name Palatinate now belongs to the detached portion of Bavaria on the west of the Rhine, while the Upper Palatinate forms another portion of the monarchy.

**Palatka**, a port and city of Florida, on the western bank of the St. John's River, 50 mi. from the sea. It is frequented by deep-sea as well as by river steamers, and has a trade in oranges, sugar, and cotton. Pop. 3,000.

**Palawan**, an island on the northeast of Borneo, belonging to the Philippines; area 4,576 sq. mi. It is mountainous, well wooded and watered, and very fertile, but unhealthy. Pop. 28,000.

## Palestine

**Pale**, in heraldry, the first and simplest kind of ordinary. It is bounded by two vertical lines at equal distances from the sides of the escutcheon, of which it encloses one third. See *Heraldry*.

**Palembang**, a town of Sumatra, capital of the province of the same name, on the Moosi, here called the Palembang. There are 25,000 inhabitants, partly inhabiting houses raised on posts, and partly living on rafts moored in the river.

**Palenque** (pá-len'ká), a village of Mexico, state of Chiapas, 60 mi. n.e. of Ciudad Real. About 7 mi. s.w. of it are some of the most extensive and magnificent ruins in America, belonging to the period anterior to the Spanish conquest. The principal of these, called the "palace," is 220 ft. long by 180 ft. wide, with numerous sculptures and hieroglyphics.

**Palermo**, a seaport town, the capital of Sicily, on the north side of the island. The city is ornamented by numerous fountains, and has many public edifices, including a cathedral of the tenth century. Other notable buildings are the churches of St. Peter and St. Dominic, a royal palace, the Cappella Palatina, the picture gallery and the armory; the National Museum, the archiepiscopal palace, the customhouse, the university, three theaters, and numerous others. Palermo is the residence of the military commandant of the island, and has an arsenal and shipbuilding yards. The manufactures consist chiefly of silks, cottons, oilcloth, leather, glass, and gloves. The principal exports are sumach, wine and spirits, fruits, sulphur, skins, oil, essences, cream of tartar, licorice, and manna; imports, colonial produce, woolen, cotton and silk tissues, hardware, earthenware, etc. The fisheries are very productive, and give employment to nearly 40,000 hands. Palermo was probably founded by the Phoenicians; it afterward became the capital of the Carthaginian possessions in Sicily. It was taken by the Romans 254 B.C. The Saracens held it for a time, and in 1072 it fell to the Normans. The German emperors and the French subsequently held it, and since the Sicilian Vespers (1282) it has shared the fortunes of the Sicilian kingdom. The court of Naples resided here from 1806 to 1815. Garibaldi captured the town in 1860. Pop. 204,712. The province of Palermo contains an area of 1,963 sq. mi. Pop. 791,928.

**Palestine** (Canaan or the Holy Land), a maritime country of Asiatic Turkey, in the southwest of Syria. Length, north to south, about 140 mi.; breadth, about 80 mi.; area, nearly 10,000 sq. mi. The coast has no indentations except the Bay of Acre in the north. The chief feature of the interior is the deep valley of the Jordan, a river which intersects the country from north to south, and connects three lakes, the Dead Sea, Lake of Gennesaret, and Lake Merom. The surface is generally mountainous. The most remarkable mountains are Carmel, Jebel, Tur (Tabor), Ebal, Gerizim, Zion, Moriah, and the Mount of Olives. The maritime or coast plains of

## Palistine

Sharon and Philistia, the river plain of Jordan, and the plain of Esdraelon in the north, are the plains worthy of mention. The principal river is the Jordan. This river has a length of 200 mi., including windings, but its direct course is only about 70. Its course from Merom to the Dead Sea is mostly below the sea level. The chief tributary of the Jordan is the Zerka or Jabbok. The most remarkable lake is the Dead Sea, 46 mi. long, 9 or 10 broad, and fully 1,300 ft. below the Mediterranean. In Palestine the wells and springs are numerous and are all counted worthy of note. Among the most interesting are the springs of hot water which issue forth on both sides of the Jordan valley. As regards geology the chief rock formation of the country on both sides of the Jordan is limestone, full of caves. Sandstone also occurs, with basalt and other volcanic rocks. Signs of volcanic action are abundant, and earthquakes are still common. The year may be divided into two seasons, summer and winter. During the former, which lasts from April to November, little or no rain falls; during the latter there is a considerable fall of rain. In the Jordan Valley and along the Mediterranean lowlands the summer heat is apt to be oppressive. During the winter the ground is seldom, if ever, frozen except in the higher elevations. Palestine was once very fertile. Among the products, besides the usual cereals, are grapes, figs, olives, oranges, and apricots. The flora of Palestine is rich in flowering plants, including the scarlet anemone, ranunculus, narcissus, crocus, pheasant's-eye, etc. The country is now, as a whole, bare and desolate, though forests of pine and oak exist. The most common tree is the oak, including the prickly evergreen oak and two deciduous species. Other trees are the olive, palm, oleander, sycamore, walnut, ash, cedar. The wild animals include the leopard, hyena, bear, wolf, jackal, boar, antelope, gazelle, porcupine, coney, jerboa, etc. The domestic animals of burden are the ass, mule, and camel. The cattle are not generally very numerous. Sheep and goats are abundant. Among the birds are eagles, vultures, hawks, ravens, bee-eaters, hoopoes, storks, and nightingales. Fish abound in the Sea of Galilee and the Jordan. The ancient name of the country was Canaan, and when thus named, in the time of the patriarchs, it was parceled out among a number of independent tribes, all probably Semitic. In the time of our Saviour Palestine was held by the Romans and divided into the four provinces of Galilee, Samaria, Judea, and Perea. In 606 Palestine was taken by the Saracens under Omar. The severities exercised toward Christians gave rise to the Crusades, but Mohammedanism prevailed. The sultan of Egypt ruled it till 1517 when it was incorporated with the Turkish Empire.

It is only within a comparatively recent period that the exploration of Palestine has been carried out systematically and with some attempt at thoroughness, though much yet remains to be done. The most valuable results

## Palissy

have been those achieved under the direction of the "Palestine Exploration Fund," a society organized in 1865 for the purpose of making an exhaustive exploration and an exact survey of the Holy Land. In 1870 the American Palestine Exploration Society was organized, and it was agreed that the English society should confine itself to the western side of the Jordan, and the American society to the eastern. The triangulation of Western Palestine was begun in 1871 and finished in 1877. A large and detailed map of the country has been published and an immense mass of valuable information regarding topography, natural history, etc., accumulated. The present population of the country is estimated at 650,000, the Arab element being probably the prevailing one, and the Arabic language generally in use.

**Palestine**, Anderson co., Tex., 181 mi. n.e. of Austin. Railroad: Inter. & Great Northern. Industries: foundry, brick yards, cotton-seed oil mill and compress, saw and grist mills, etc. Exports include cotton, lumber, grapes, etc. Pop. 1900, 8,297.

**Palette**, PAINTER's, an oval tablet of wood, or other material, very thin and smooth, on which painters lay the various colors they intend to use, so as to have them ready for the pencil. In connection with the palette painters use a palette knife, a thin, round-pointed knife for mixing up colors. The palette is held by a hole at one end in which the thumb is inserted.

**Pāli**, the sacred language of the Buddhists, as closely related to Sanskrit as Italian to Latin. It is the language in which the oldest religious, philosophical, and historical literature of Buddhism is written, and is especially the language of the sacred books of the Buddhists of Ceylon, Burmah, and Siam; but it is no longer spoken anywhere, though a corrupt form of it is to some extent used for literary purposes. The study of Pāli was introduced into Europe by Lassen and Burnouf.

**Palicourea** (pā-li-kō' rē-a), a genus of plants, nat. order Rubiaceae, tropical American shrubs, with small or rather large flowers in compound thyrses or corymbs.

**Palimpsest**, a manuscript prepared by erasure for being written on again, especially a parchment so prepared by washing or scraping. This custom was brought about by the costliness of writing materials, and was practised both by the Greeks and Romans, and in the monasteries, especially from the seventh to the thirteenth centuries. That which replaced the ancient manuscripts was nearly always some writing of an ecclesiastical character. The parchments which have been scraped are nearly indecipherable. Those which have been washed have often been revived by chemical processes. Fragments of the *Iliad* and extensive portions of many Greek and Roman writers have been recovered by these means.

**Palissy**, BERNARD (1510-1590), a French artist and philosopher. After sixteen years of unremunerated labor (1538-54), he obtained a pure white enamel, affording a perfect ground for the application of decorative art. He was then able to produce works in which he repre-

## Palissy Ware

sented natural objects grouped and portrayed with consummate skill, and his enameled pottery and sculptures in clay became recognized as works of art. In 1562 he went to establish himself at Paris, where he continued to work at his art, and also delivered scientific lectures, which were attended by the most distinguished men in Paris, and contained views far ahead of his time. He suffered persecution as a Huguenot, and was arrested in 1589 and thrown into the Bastille, where he is said to have died.

**Palissy Ware**, a peculiar kind of French art pottery invented by Bernard Palissy. The surface is covered with a jasper-like, white enamel, upon which animals, insects, and plants are represented in their natural forms and colors. Specimens of this ware are much valued and sought after by collectors.

**Palladian Architecture**, a species of Italian architecture due to Palladio, founded upon the Roman antique as interpreted by the writings of Vitruvius, but rather upon the secular buildings of the Romans than upon their temples. It is consequently more applicable to palaces and civic buildings than to churches. A characteristic feature of the style is the use of engaged columns in façades, a single row of these often running through the two principal stories.

**Palla'dio**, ANDREA (1518-1580), one of the greatest classical architects of modern Italy, was b. at Vicenza. He perfected his architectural acquirements at Rome, and on his return to Vicenza he established his fame by his designs for many noble buildings both there and in other parts of Italy. From 1560 he erected many buildings at Venice. He was the author of a *Treatise on Architecture*.

**Palla'dium**, a wooden image of Minerva which is said to have fallen from heaven, and to have been preserved in Troy. The Trojans believed that their city would be invincible so long as it contained the Palladium. The Romans pretended that it was brought to Italy by Æneas, and preserved in the temple of Vesta at Rome, but several Greek cities claimed to possess it.

**Palla'dium**, a metal discovered by Wollaston in 1803, and found in small quantity associated with native gold and platinum. It presents a great general resemblance to platinum, but is harder, lighter, and more easily oxidized. It is useful on account of its hardness, lightness, and resistance to tarnish, in the construction of philosophical instruments.

**Pallas**, of the minor planets revolving round the sun between Mars and Jupiter, that whose orbit is most inclined to the ecliptic. It was discovered in 1802 by Olbers at Bremen. It revolves round the sun in 4.61 yrs; diameter 172 mi.

**Pallas Athēnē**, the Greek goddess of wisdom, subsequently identified with the Roman Minerva.

**Palma**, an episcopal city of Spain, capital of the island of Majorca, 130 mi. s. of Barcelona. It is built in the form of an amphitheater, and enjoys an extremely mild and salubrious cli-

## Palmerston

mate. The principal public buildings are the cathedral, the exchange, the governor's palace, and the townhouse. There are schools of medicine and surgery, normal and nautical schools, two public libraries, and a museum. Ship-building yards employ numerous hands. Palma is the port of the whole island, and has an important trade. Pop. 59,493.

**Palma**, TOMAS ESTRADA (1835—), a Cuban general and patriot; b. in Bayamo, in 1835. He soon became an ardent advocate of Cuban independence and joined the revolution of 1868, thereby losing his estate. In 1895 he was chosen as the foreign representative of the Cubans, and came to reside in New York. On Dec. 31, 1901, he was elected president of the Cuban Republic.

**Palmer**, ALICE FREEMAN, b. Broome co., N. Y., in 1855. She was graduated from the University of Michigan in 1876 and became instructor at Geneva Lake, Wis. In 1879 she was appointed professor of history in Wellesley College, and in 1882 became president of that institution. She was married to Prof. George H. Palmer of Harvard in 1887. She was a member of the faculty of the University of Chicago from 1892 to 1895. Died Dec. 6, 1902.

**Palmer**, JOHN M., b. in Scott co., Ky., in 1817. He was admitted to the bar of Illinois in 1840 and served in the state senate, and in 1860 was a member of the Electoral College as a Republican. He took an active part in the Civil War and became major general of volunteers. He was governor of Illinois from 1869 to 1873, and was elected U. S. Senator from Illinois in 1891 as a Democrat. In 1896 he became presidential candidate of the "Gold Democrats." Died Sept. 25, 1900.

**Palmer**, THOMAS W., b. in Detroit, Mich., in 1830. He was graduated from the University of Michigan and engaged in the real estate and lumber trade. He was a member of the state senate in 1878, and in 1883 was elected U. S. Senator from Michigan. Afterward he was appointed minister to Spain. In 1890 he was elected president of the National Commission which had charge of the World's Columbian Exposition in 1893.

**Palmer**, Hampden co., Mass., on Quaboag River, 15 mi. e. of Springfield. Railroads: Boston & Albany; New London Northern; Ware River. Industries: cotton mills, iron foundry, woolen mills, wire mill, and carpet factory. Surrounding country agricultural. Pop. 1900, 7,801.

**Palmerston** (pā'mer-stun), HENRY JOHN TEMPLE, VISCOUNT (1784-1865), English statesman, was b. in Westminster. In 1807 he was returned to Parliament as member for Newport, Isle of Wight, and became junior lord of the admiralty in the Duke of Portland's administration. In 1809 he became secretary of war, and two years later he was elected member for Cambridge University. He was a supporter of Catholic emancipation, and retired from office in the Wellington ministry in 1828 with others of the Canning party. In 1831 he was returned for Bletchingly, and after the Reform bill (1832) for South Hants.

## Palmetto Palm

He continued in office as foreign secretary until 1841. It was during this period that he gained his great reputation for vigilance and energy in the conduct of foreign affairs. In February, 1852, he became home secretary in the coalition ministry of Lord Aberdeen. On the resignation of his ministry he became prime minister, which position he held, with a brief interruption, for the remainder of his life.

**Palmetto Palm**, a common name of several palms, especially the cabbage palm, which grows in the West Indies and in the Southern states. It attains the height of 40 or 50 ft. and is crowned with a tuft of large leaves. It produces useful timber, and the leaves are made into hats, mats, etc.

**Palmistry** (or Chiromancy) (Gr. *cheir* "the hand," and *mantikē*, "divination"), is the art of "reading the palm"—the art which professes to discover the temperament and character of any one, as well as the past and future events of his life, from an examination of the palm of his hand, and of the lines traced upon it. As a considerable body of very complicated rules and directions have been laid down by authorities, ancient and modern, to enable the student to read the palm, palmistry claims to be regarded as a "science," or at least as a branch of an interpretative science of the hand in general, to which the name *Chirosophy* has been given. The other branch of this general science has been called *Chirognomy*, and is concerned with the interpretation of the form and character of the hand and fingers, while Chiromancy treats of the palm only.

As an art palmistry appears to be of great antiquity. There is a caste of Brahmans, called Joshi, who profess the art of fortune-telling by means of marks on the palms of the hands, the face, and the body generally; and who seem to have practised it from remote times. Palmistry has an ancient literature of its own in India; the ancient Samudriki appears to have had some acquaintance with letters, but the Joshi, his modern representative, is quite illiterate, though he generally carries about with him a manual of palmistry, of whose contents he knows nothing. There are also a number of wandering outcasts in India who tell fortunes by palmistry.

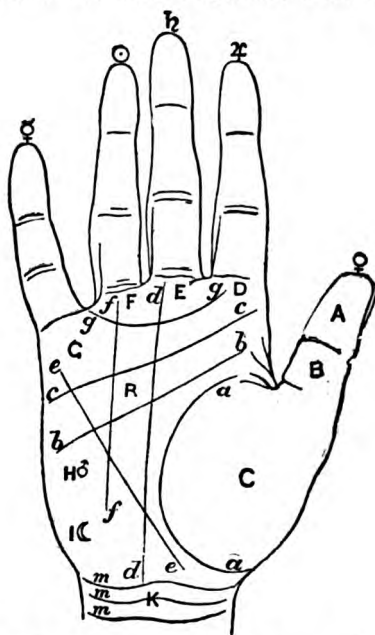
That palmistry was to some extent at least known to the ancient Greeks we have evidence in the writings of the Stagirite himself. In his *Historia Animalium* Aristotle observes that long-lived persons have one or two lines which extend through the whole hand; short-lived persons have two lines not extending through the whole hand. Other references to this subject occur in the doubtful works, the *Proble-mata* and the *Physiognomika*, attributed to him. Pliny, too, in his *Natural History*, directly asserts that Aristotle regarded numerous broken lines in the palm of the hand as a prognostic of short life.

Of the cultivation of palmistry among the Romans there is little evidence; but Juvenal, in showing up the curiosity of women and their love of prying into forbidden mysteries,

## Palmistry

describes the woman of fashion as consulting eagerly Chaldean astrologers and other diviners. In the second century Artemidorus of Ephesus, the author of a work on the interpretation of dreams, is said to have devoted a whole treatise to the subject, which, however, is not extant.

In the writers of the Middle Ages there is much reference to the subject, and the names of Paracelsus, Albertus Magnus, and Cardanus have been associated with it. But the most important work on chiromancy belonging to this period seems to be *Die Kunst Chiromantia*, of Johann Hartlieb, which was printed at Augsburg in 1475. In the sixteenth century we find several treatises on the subject, of which the most important seem to be



A.—will; B.—logic; C.—mount of Venus; D.—mount of Jupiter; E.—mount of Saturn; F.—mount of Apollo; G.—mount of Mercury; H.—mount of Mars; I.—mount of the Moon; K.—the rascette; a, a.—line of life; b, b.—line of head; c, c.—line of heart; d, d.—line of Saturn or fate; e, e.—line of liver or health; f, f.—line of Apollo or fortune; g, g.—the girdle of Venus; R—the quadrangle; m, m, m.—bracelets of life.

those of Johann Indagine, and of Barthel-emy Cocles "de Bouloigne," doctor of natural philosophy and of medicine. In the end of the eighteenth century palmistry found an important exponent in the celebrated Marie Anne Lenormand (1772-1843), who in her *Souvenirs Prophétiques d'une Sibylle* (1814) foretold the downfall of Napoleon. The chief authorities on palmistry in recent times are two Frenchmen—M. le Capitaine D'Arpentigny, and M. Adrien Desbarrolles; and it is on their works that modern English books on the subject are chiefly founded. D'Arpentigny has expounded principally chirognomy, or that



## Palmyristy

branch of the interpretative science of the hand which treats of the general form of the hand and fingers. The observation of the fingers and joints of the hand is quite as important to the chiromant as that of the palm itself; but we must refer for D'Arpentigny's system to the works cited below. The thumb is generally regarded as chiromantically the most important part of the hand. The first, or upper phalange of the thumb, when well developed, shows the presence of will and decision of character; the second, according to its development, indicates more or less logical power (see A and B in diagram). What has to be considered by the chiromant proper is the "mounts" of the hand, with the marks on them, and the lines in the palm. The "mounts" are the elevations at the base of the fingers and thumb and in the "percussion" of the hand, i. e., the side of the palm which extends from the root of the little finger to the wrist; it is so called because it is used in striking. They are seven in number, and are named from the planets, by the signs of which they are also known—viz., ♀ for Venus, ♃ for Jupiter, ♄ for Saturn, ☉ Apollo, ☿ Mercury, ♂ Mars, ☾ the Moon (see diagram). When well developed the mounts indicate the possession of the quality associated with the respective planets—e.g., Jupiter developed denotes pride and ambition; Saturn, fatality; Apollo, art or riches; Mercury, science or wit; Mars, courage or cruelty; Venus, love and melody; the Moon, folly or imagination. But the effect of a greatly developed mount may be modified by the lines in the palm or by other signs.

There are four principal lines—viz., the line of life, which surrounds the thumb, and which, if long, indicates a long life; the line of head, the line of heart, and the rascette or the bracelet. These last (the bracelets), if well marked strengthen the effect of the line of life, each bracelet indicating thirty years of life. The line of heart (the *linea mensalis* of ancient chiromancy), if long, clear cut, and well colored, denotes an affectionate and devoted character; and the nearer the line stretches to Jupiter the better the character. If the line end in a fork, so much the better. In actors and mimics this line ascends the mount of Mercury. A good line of head—i.e., a clear-cut, long, unbroken line—indicates the presence of superior intellectual qualities. If the line stretch to the mount of the Moon, it indicates imagination. A winding headline shows folly and indecision of character; a linked line (like a chain) denotes want of concentration. The other lines (which are not present in all hands) are the line of Saturn or fate (*d, d*), the line of Apollo (*f, f*), the line of liver or health (*e, e*), and the line of Venus (*g, g*). A long, clear-cut line of Saturn (see diagram) foretells a happy and prosperous life, breaks or windings in the line foretell misfortunes or obstacles; a good line of Apollo shows that its owner will be successful in art; a good liver-line promises a long and healthy life; while the Venus line (*Cingulum Veneris*), when present, indicates a character very liable to be influenced by the passion

## Palmyra

of love. Marks on the mounts or lines, such as stars, crosses, etc., have their respective significations. A good open space between the lines of head and heart (the quadrangle) indicates a generous and noble disposition, while a very narrow space in the quadrangle is a sign of avarice and egotism.

**Palm Oil**, a fatty substance obtained from several species of palms, but chiefly from the fruit of the oil palm, a native of the west coast of Africa. This tree grows to the height of 30 ft., bears a tuft of large pinnate leaves, and has a thick stem covered with the stumps of the stalks of dead leaves. The fruits, which are borne in dense clusters, are about 1½ in. long by 1 in. in diameter, and the oil is obtained from their fleshy covering. In cold countries it acquires the consistence of butter, and is of an orange-yellow color. It is employed in the manufacture of soap and candles, for lubricating machinery, wheels of railway carriages, etc. By the natives of the Gold Coast this oil is used as butter; and when eaten fresh is a wholesome and delicate article of diet.

**Palms**, the *Palmaceæ*, a nat. order of arborescent endogens, chiefly inhabiting the tropics, distinguished by their fleshy, colorless, six-parted flowers, enclosed within spathe; their minute embryo lying in the midst of albumen, and remote from the hilum; and their rigid, plaited, or pinnated leaves, sometimes called fronds. The palms are among the most interesting plants in the vegetable kingdom, from their beauty, variety, and associations, as well as from their great value to mankind. While some have trunks as slender as the reed, or longer than the longest cable, others have stems 3 and even 5 ft. thick; while some are of low growth, others exhibit a stem towering from 160 to 190 ft. high, as the wax palm of South America. About 600 species are known, but it is probable that many are still undescribed. Wine, oil, wax, flour, sugar, sago, etc., are the produce of palms; to which may be added thread, utensils, weapons, and materials for building houses, boats, etc. There is scarcely a single species in which some useful property is not found. The cocoanut, the date, and others are valued for their fruit; the cabbage palm, for its edible terminal buds; the fan palm, and many more, are valued for their foliage, whose hardness and durability render it an excellent material for thatching; the sweet juice of the Palmyra and others, when fermented, yields wine; the center of the sago palm abounds in nutritive starch; the trunk of the wax palm exudes a valuable wax; oil is expressed in abundance from the oil palm; many of the species contain so hard a kind of fibrous matter that it is used instead of needles, or so tough that it is manufactured into cordage; and, finally, their trunks are in some cases valued for their strength, and used as timber, or for their elasticity or flexibility.

**Palmy'ra**, an ancient city of Syria, now in ruins, situated in oasis 140 mi. e.n.e. of Damascus. It was founded or enlarged by Solomon in the tenth century B.C. In 1400 Tamerlane completely destroyed it. There

## Palmyra Palm

are remains of ancient buildings, chiefly of the Corinthian order, with the exception of the Temple of the Sun, which is Ionic.

**Palmy'ra Palm**, the common Indian palm, a tree ranging from the northeastern parts of Arabia through India to the Bay of Bengal. In India and other parts of Asia it forms the chief support of 6,000,000 or 7,000,000 of population. Its fruit is a valuable food, its timber is excellent, and it furnishes thatch, cordage, and material for hats, fans, umbrellas, etc. It produces sugar and arrack, and its leaves are used for writing tablets. The young shoots are boiled and eaten, the seeds are edible, and the fruit yields a useful oil. A full-grown palmyra is from 60 to 70 ft. high, and its leaves are very large. The name palmyra-wood is frequently given to other woods of a similar nature.

**Palpitation** consists of repeated attacks of violent and spasmodic action of the heart. When palpitation arises from organic lesion of the heart it is called *symptomatic*, when it is caused by other disorders disturbing the heart's action it is called *functional*. Disorders which may cause palpitation include nervous affections, anæmia, chlorosis, protracted mental emotion, excessive use of stimulants, etc.

**Paludan-Müller, FRIEDERIK** (1809-1871), the chief recent poet of Denmark, educated at Copenhagen University. He began his career as a poet in 1832. His works include *Adam Homo*, a humorous didactic poem; *Kalanus*, an Indian tragedy; *Adonis*, a poetic romance; *Amor and Psyche*, a lyrical drama, etc.

**Pamir** (pā'mēr), an elevated region of Central Asia, that may be regarded as formed by the meeting of the Himalayan and Thian Shan mountain systems. It forms a plateau having a general elevation of more than 13,000 ft., dominated by still loftier ridges and summits clothed with eternal snow. There are several small lakes here, and the sources of the Oxus take their rise in the Pamir. The atmosphere is exceedingly dry, the extremes of heat and cold are very great, and great part of the surface is bare and barren. The Kirghiz, however, find a certain amount of pasture for their cattle in summer, and in favored localities there is a little cultivation. The Pamir, or "roof of the world," is celebrated throughout Central Asia, and trade routes have passed across it for ages.

**Pam'lico Sound**, a shallow lagoon on the southeast coast of North Carolina. It is 80 mi. long, from 8 to 30 mi. wide, and separated from the ocean by long, narrow, sandy islands.

**Pampas**, a name given to the vast treeless plains of South America in the Argentine Republic, Paraguay, and Uruguay. The pampas are generally covered with grass and other herbage, and in many parts with gigantic thistles, but with the heat of summer the vegetation is much burned up. Shallow lakes or swamps occur in some parts, and parts have the character of a salt steppe. The pampas are roamed over by various tribes of Indians, as well as by herds of wild horses and cattle. In

## Panama

many parts there are now cattle ranches, and large flocks of sheep are also reared.

**Pamphyl'ia**, an ancient province of Asia Minor, extending along the Mediterranean from Cilicia on the east to Lycia on the west. It was mountainous, being covered with the ramifications of the Taurus Mountains. Pamphylia never attained any political importance. It was subject successively to Persia, Macedonia, Syria, and Rome, although some Greek colonies for a time maintained their independence.

**Pan**, a rural divinity of ancient Greece, the god of flocks and herds, represented as old, with two horns, pointed ears, a goat's beard, goat's tail, and goat's feet. The worship of Pan was well established, particularly in Arcadia. Pan invented the syrinx or *pandean* pipes.

**Pana**, Christian co., Ill., 42 mi. s.e. of Springfield. Railroads: C. C. C. & St. L.; Illinois Central; and Ohio & Mississippi. Pop. 1900, 5,530.

**Panama, REPUBLIC OF**, an independent state of South America, whose territory is co-extensive with that of the Isthmus of Panama. Its extension from east to west is about 460 miles, and its breadth varies from 70 to 31 miles, where the isthmus is narrowest, between the cities of Colon and Panama. This is the narrow neck of land traversed by the Panama Railway and across which the Panama Canal is now under construction. The surface is generally uneven and rocky. The Pacific coast is high and broken, but that along the Caribbean is low and more even. The country has a tropical climate and heavy rainfall. The region is generally unhealthful to all except native people. The population is made up of mixed races, of Spanish, Indian and negro origin, and contains but few white men. A few of the native tribes still remain, and in the western portion of the country have maintained their original organizations and language. The leading industries are grazing and agriculture, and on the Pacific coast pearl fishing. The only important cities are Panama and Colon. Panama is the capital and the Pacific terminus of the railway. It is a city of 25,000 and is the center of finance and influence for the republic. Colon is the Atlantic terminus of the railway, has a population of about 3,000 and has attained some importance from its relations to the operations on the Panama Canal.

The first European settlement on the American continent was made at Darien, and since 1535 the isthmus has been considered of unusual importance on account of the transit of passengers and merchandise from ocean to ocean. In 1718 Panama was incorporated as a department of the Republic of New Granada. In 1859 this union was dissolved and the State continued as an independent government until 1861, when it returned to its former political dependence. Its relations to the government of Colombia have been political only. In 1846 the United States ratified a treaty with New Granada by which it guaranteed the neutrality



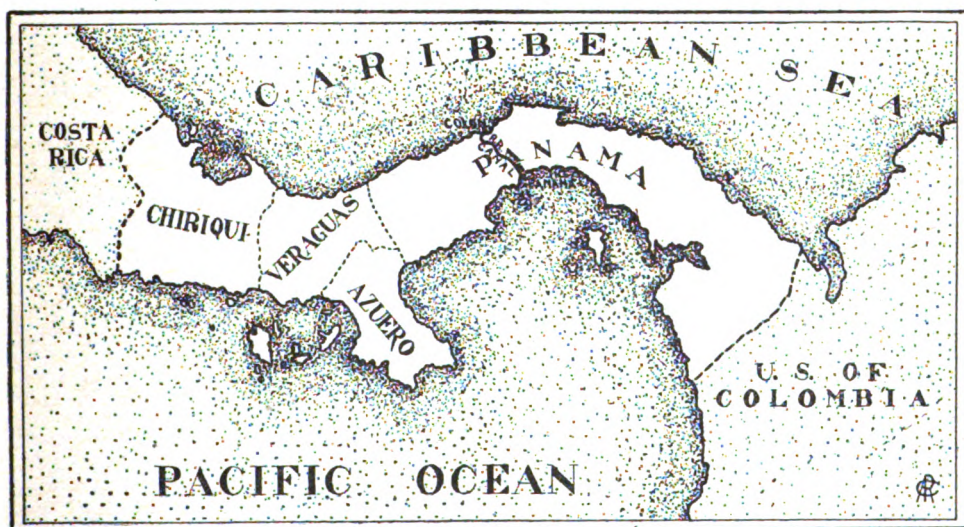
## Panama

of the isthmus and free transit over the Panama Railroad. Since that date American interference has been necessary a number of times in order to maintain the integrity of the railroad and the isthmus. On account of its geographical position the Republic of Panama is of great strategic importance, and when in August, 1903, the United States of Colombia rejected the treaty providing for the construction of the Panama Canal by the United States, the inhabitants of Panama felt that their interests were imperiled to such an extent as to warrant their withdrawal from the government and the establishment of an independent state. Accordingly measures to this end were immediately taken. The treaty between the United States and Colombia was such as to favor any movement toward independence that Panama might take, for while this treaty did not admit of interference on the part of the United States for the purpose of

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the Republic of Panama was officially recognized and the United States of Colombia was informed of this fact. Within three days the revolution was complete and a temporary government was organized. Phillipe Bunau-Varilla was appointed by the Panama Junta diplomatic agent to the United States, where he was officially received November 12th. An election was held on December 27th, at which officers of the government and members to a constitutional convention were chosen. This convention met on January 20, 1904, and adopted a constitution based on that of the United States. The election under this constitution occurred on February 20th and the government was immediately organized on a permanent basis.

As soon as France and Great Britain were assured that the Republic of Panama would assume the obligations of the Colombian government towards the Panama Canal Company



quelling a rebellion or repelling an invasion, provided neither interfered with the Panama Railroad, yet the position of that railroad is such that invasion or rebellion were sure to effect it and the maintenance of transit which the United States is required to secure would necessarily lead that government to prevent any extensive military operations within the territory. On November 2, 1903, the municipality of the city of Panama held a meeting and passed an ordinance of secession for the state of Panama and for the establishment of an independent government which should be republican in form. The United States immediately sent warships and marines to the ports of Colon and Panama and refused to allow Colombian troops to land at any ports on the isthmus. As soon as the United States was officially informed by the American Consul at Panama that a de facto government existed,

and certain financial obligations due from Colombia to the citizens of these respective countries, they followed the United States in recognizing the new republic. Other European governments soon followed the lead of France and Great Britain, so that the position of the republic among the nations was early assured. The United States of Colombia very naturally entered strenuous objections to the recognition of Panama by the United States and by the governments of Europe. But these were wholly ineffective and the movement was completed without serious diplomatic entanglements and entirely without bloodshed.

On November 16th a treaty was signed between Bunau-Varilla for the Republic of Panama and Secretary of State John Hay for the United States, providing for the construction of an isthmian canal. This treaty was ratified by the Panama Junta on the second of Decem-

## Panama Canal

ber, but when presented to the United States Senate it met vigorous objection on the part of the Senators who favored the Nicaragua Canal, and others who were opposed to the Administration. This objection succeeded in delaying the treaty until February 24, 1904, when it was ratified by a vote of 66 in favor to 17 against. The five articles of the treaty deal exclusively with the question of sovereignty and are as follows:

Article I. The United States guarantees and agrees to maintain the independence of the Republic of Panama.

Article II. The Republic of Panama cedes to the United States five miles on each side of the canal and three marine leagues at each terminal and also any other lands necessary to the construction or maintenance of the canal and its auxiliaries.

Article III. The Republic of Panama cedes to the United States the right to exercise the same power and authority over such lands "as if it were sovereign" and to the exclusion of such power by Panama.

Article IV. The Republic of Panama grants to the United States the use of all the rivers, streams and waters for navigation or so far as is necessary to the construction of the canal and its auxiliaries, including purposes of sanitation.

Article V. The Republic of Panama grants to the United States in perpetuity a monopoly of any system of communication across its territory by canal or by railroad. See *Panama Canal*.

**Panama Canal**, a canal to extend across the Isthmus of Panama from Colon on the Caribbean coast to Panama on the Pacific.

**Early History.**—The question of an isthmian canal is more than three centuries old. The first desire for such a canal was aroused by the Spanish conquest of Peru and Chili. At that time Ferdinand, King of Spain, proposed to cut a canal through the Isthmus of Panama so as to secure easy access to his new possessions, and his successor, Philip, thought favorably of a route across Nicaragua, but on account of European complications nothing was done with either project.

In 1665 Great Britain became interested in the Nicaraguan route and for the next quarter of a century attempted to gain control of it. The explorer Von Humboldt, who visited Central America early in the nineteenth century, saw the advantage and necessity of such a canal and expressed his belief that sometime it would be constructed by the United States.

The United States government first became interested in the isthmian canal project in 1825, when its representative to Nicaragua secured concessions for the construction of such a canal, and the following year Henry Clay, who was Secretary of State, ordered an examination of the route, but the matter was dropped soon after. Three years later, the King of Holland obtained a franchise for the construction of the canal, but this plan was annulled the following year and nothing further of importance was done until 1847, when Great

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Britain obtained control of the proposed route. Great Britain's claim was disputed by the governments of Nicaragua and the United States, and nothing further was done until 1849, when Cornelius Vanderbilt formed a company which secured concessions from Nicaragua for the construction of a canal. In the meantime the discovery of gold in California increased the demand for such a waterway, and the Vanderbilt company began operations. After spending some two millions of dollars, however, they found that the project was beyond their ability and attempted to secure the aid of the United States government. This aid was refused and the project fell through.

In 1846 the United States entered into a treaty with New Granada, in which our government agreed to insure the neutrality of the Isthmus of Panama for the transit of passengers and merchandise and to defend such neutrality against all aggressors. The completion of the Panama railroad soon after rendered this compact of international importance. In 1850 the Clayton-Bulwer treaty was ratified with Great Britain. This treaty provided that neither the United States nor Great Britain should exercise absolute control over any isthmian canal that might be constructed. Although the treaty was not satisfactory to the United States, it remained in force, with few violations on the part of either of the high contracting parties, until it was superseded by the Hay-Pauncefote treaty of 1901. By the terms of this treaty the Clayton-Bulwer treaty was abrogated and the privilege of the United States to construct, regulate and manage an isthmian canal was recognized. The same rules for navigating this canal as now control the navigation of the Suez Canal were adopted; that is, it is to be free and open to vessels of all nations, either of commerce or war, and is never to be blockaded, nor shall any act of war ever be exercised or permitted within it.

**Panama Canal.**—The history of the Panama Canal properly dates from 1878, though some years previous to this George M. Totten, chief engineer of the Panama railroad, made a tentative survey for a canal, following the line of the railroad, and showed the feasibility of its construction, estimating the cost from \$60,000,000 to \$150,000,000. His report was followed by a government survey under the direction of Commander E. P. Lull of the United States Navy. This survey resulted in locating the canal practically on the present route. In 1878 a concession was given Lieutenant Weyse and others by the government of Colombia to construct and maintain a canal across the isthmus. In the year following a congress of engineers was called at Paris under the direction of Ferdinand De Lesseps. This congress consisted of 135 delegates, most of whom were engineers, and eleven of them were from the United States. After a thorough discussion of the various routes proposed, the congress decided unanimously that the Panama route was the most desirable and it was selected. Immediately after the adjournment of the con-



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gress the Interoceanic Shipcanal Company was organized and De Lesseps, under whose direction the Suez Canal had been constructed, was made president. This company proposed to cut a sea level canal 29½ feet deep, from 72 to 78 feet wide at the bottom and from 92 to 164 feet wide at the surface. The length of the canal including harbors was to be 46.09 miles, and 43.02 miles without the harbors. De Lesseps estimated that the cost would be \$127,000,000, which was considerably less than the estimate made by the congress. At the close of 1888 this company had expended \$200,000,000 and had not completed one-third of the work. Being pressed for funds, the company resorted to bribery as a means of securing additional aid and their operations grew into the most noted financial scandal in French history. The company was finally declared bankrupt by the government and a receiver was appointed.

The receiver was authorized to organize a new company and to proceed with the construction of the canal. On account of legal difficulties, pending the settling of the affairs of the old company, the new organization was not formed until 1894. This company, known as the Panama Canal Company, was capitalized at \$13,000,000, and stock to the amount of \$1,000,000 was given to the United States of Colombia. The company abandoned the sea level project and substituted a series of locks in place of it, as this would greatly reduce the expense of construction. During the next few years a little work was done and about \$8,000,000 had been expended when the company again ceased operations.

In the meantime, several events had transpired to keep alive the interest in the Nicaragua route, and in 1895 the Congress of the United States authorized the appointment of a commission to investigate thoroughly its advantages. At that time it seemed that there was no possibility of the completion of the Panama Canal by the French company. This commission, generally known as the Ludlow Commission, made a tentative survey of the Nicaragua route and reported to Congress. In 1899 President McKinley was authorized to appoint a larger commission, with powers to make a more thorough and complete investigation. This is generally known as the Walker Commission, from its chairman, Rear Admiral John G. Walker of the United States Navy. Admiral Walker was assisted by a number of the most eminent engineers of the country, and after a very thorough investigation, the commission reported in favor of the construction of a canal by the Nicaragua route, stating that the principal reason for this report was the financial difficulty involved in purchasing the right of way from the Panama Canal Company, who wanted \$102,400,000 for their franchises and property, while the estimate of the commission on the value of these assets was \$40,000,000.

Immediately after this report was rendered to Congress, the French company offered to

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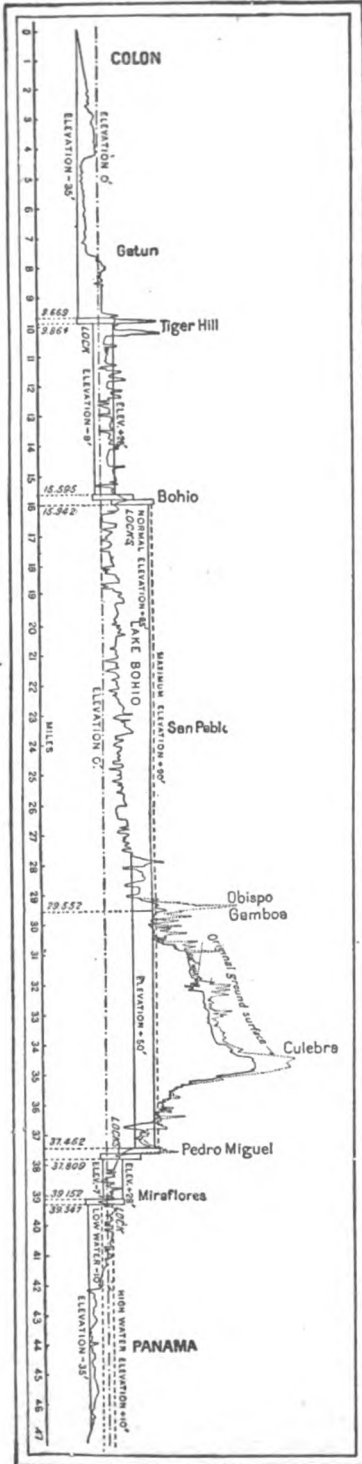
sell to the United States their entire claims, including franchises, machinery, right of way and the Panama railway, for \$40,000,000, the value placed upon them by the commission. Following this offer the commission made a supplemental report recommending the purchase of the property and the adoption of the Panama route. In the meanwhile the House of Representatives had passed a bill authorizing the construction of the canal by the Nicaragua route, but this bill was rejected by the Senate in view of the supplementary report of the commission, and in place of it the Senate passed the Spooner Act, which authorized the President to purchase of the Panama Canal Company all their assets pertaining to the canal, for the sum of \$40,000,000, providing a valid title to the property could be secured and a satisfactory treaty for the construction and control of the canal could be ratified with the United States of Colombia. This measure was accepted by the House and became a law in June, 1902.

In pursuance of the provisions of this act, a treaty was negotiated between Honorable John Hay, Secretary of State of the United States, and Dr. Herran, Minister Plenipotentiary from Colombia, and presented to the Senate of the Fifty-seventh Congress, in January, 1903. The treaty provided for the construction and control of the canal by the United States and the payment to the United States of Colombia of \$10,000,000 in gold for the concessions granted, and an annuity of \$250,000 a year after nine years following the ratification of the treaty. The treaty met with strong opposition from a few senators, who, under the lead of Senator Morgan, were strongly in favor of the Nicaragua route, and on this account its ratification was delayed until after the adjournment of the Fifty-seventh Congress. However, at an extra session called immediately by the President, it was ratified on March 18, 1903, and sent to the Colombian government. After several months of delay, during which the treaty was the subject of several stormy debates in the Colombian Senate, it was rejected by that body before its final adjournment in August. This rejection led to the immediate withdrawal of the senators from the State of Panama, and ultimately to the secession of that state. (See *Panama, Republic of*.)

Immediately after the organization of the government of Panama, they had sent to the United States Senate a treaty providing for the construction of the canal on nearly the same terms as were embodied in the treaty with the United States of Colombia. The account of the adoption of this treaty is found in the article on *Panama, Republic of*. It contains the following provisions in regard to the canal:

(1) The Republic of Panama agrees to secure for the United States the lands and rights that are required in the towns of Panama and Colon to effect the improvements provided for in the treaty, and authorizes the United States to impose and collect equitable water rates during fifty years. At the end of that time the use of the water shall be free for the in-

## Panama Canal



habitants of Panama and Colon, except so far as may be necessary for the operation and maintenance of the water system and auxiliaries.

(2) That the Republic of Panama shall not pay more for official dispatches over the telegraph and telephone lines to be constructed than those required from officials of the United States.

(3) That the Republic of Panama shall permit immigration and free access to the lands and workshops of the canal and its auxiliaries to all employees of whatever nationality, provided they are under contract for work in any way connected with the canal.

(4) That such persons with their fam-

ilies shall be exempt from military service of the Republic of Panama.

(5) That the United States may import into the canal zone free of duty any materials convenient in the construction, maintenance and operation of the canal and auxiliary works, and all provisions, medicines, clothing and supplies for use of all persons in the employ of the United States, and for their families.

(6) That the canal when completed shall be neutral in perpetuity, and shall be opened on the terms provided for by Section I of Article III of the Hay-Pauncefote treaty of November 18, 1901.

(7) That the Republic of Panama shall have the right to transport over the canal its vessels, troops and munitions of war at all times free of charge.

(8) That the Republic of Panama agrees if it should become necessary at any time to employ armed forces to protect the canal or the ships using the same or the railways and auxiliary works, to provide the necessary forces for such purposes, and that if it cannot effectively handle the situation, the Panama government will allow the United States to employ whatever force may be necessary for that sole purpose, the said force to be withdrawn when the necessity for its presence has ceased.

(10) That when the circumstances demand, the United States may send forces to the isthmus without the advice or consent of the Panama government.

(11) That no change either in the government or laws and treaties of the Republic of Panama shall, without the consent of the United States, affect in any way the provisions of this treaty.

Early in March, 1904, President Roosevelt appointed the following canal commission: Rear Admiral John G. Walker, of the United States navy; Major-General George W. Davis, of the United States army; William Barclay Parsons, of New York; William H. Burr, New York; Benjamin M. Harrod, of Louisiana; Carl Ewald Grunsky, of California; and Frank J. Hecker, of Michigan. This commission met in Washington March 22nd and organized. By appointment Admiral Walker was made chairman and the commission immediately began preparations for sailing to the scene of its labors. By the 29th of March it was on the way and immediately began active operations. The first work necessary is that of sanitation, which it is thought will require about one year to complete. Following the completion of this, the construction of the canal will be pushed as rapidly as possible. On May 4, 1904, the commission took formal possession of the canal property, and the payment of the \$40,000,000 was promptly made the French company. Thus was closed a question which, for more than half a century, has been an element of uncertainty in the international affairs of both Europe and America. The controversy between the parties favoring respectively the Nicaragua and Panama routes renders the following comparison as to their merits of consid-

## Panama Canal

erable interest. It is taken from the report of the first Walker Commission.

	Panama.	Nicaragua.
Total length, ocean to ocean, miles.....	46.09	183.66
Length between terminal harbors.....	43.02	180.59
Length of canal sections.....	36.41	73.78
Sailing in lakes (Bohio or Nicaragua).....	12.68	70.51
Total excavation needed, cubic yards.....	90,000,000	185,000,000
Estimated total cost to complete.....	\$144,000,000	\$190,000,000
Annual cost of maintenance, estimated.....	\$2,000,000	\$3,300,000
Summit level above sea, feet.....	85	110
Water supply for summit level.....	Ample	Ample
Regulation of water supply.....	Automatic	Manipulated
Number of locks.....	5	8
Great dams, proportional size.....	4	3
Height of deep cuts, feet.....	110	297
Total length of curves, miles.....	22.85	49.29
Total curvature, degrees.....	771	2,339
Shortest curve, feet radius.....	6,234	4,045
Number of curves under 5,000 feet radius.....	.....	10
Number of curves under 6,000 feet radius.....	.....	33
Number of curves under 7,000 feet radius.....	3	39
Number of curves under 8,000 feet radius.....	3	42
Total number of curves.....	28	56
Harbors to be constructed, number.....	.....	2
Railroad to be built, miles.....	.....	12
Could canal be made sea level?.....	Yes	No
Estimated time of passage, hours.....	12	33
Ships go through in daylight.....	Yes	No
Proportional danger of delays.....	1	10
Healthfulness of climate.....	Same	Same
Rainfall.....	.....	Heavier
Hazard of storms in lake navigation.....	.....	Great
Hazard of earthquake interference.....	Small	Larger
Greater distance, New York to San Francisco, miles, via.....	363	.....
Greater distance New Orleans to San Francisco, miles, via.....	580	.....
Quicker passage of ten-knot ship, New York to San Francisco, hours, via.....	.....	29
Quicker passage of fifteen-knot ship, New York to San Francisco, hours, via.....	.....	13
Quicker passage of twenty-knot ship, New York to San Francisco, hours, via.....	.....	4
American ports to west coast of South America.....	Shorter	.....
American ports to Asia, Philippines, etc.....	Same	Same
European ports to west coast of South America.....	Shorter	.....
European ports to North Pacific points.....	.....	Shorter
European points to Asia.....	Same	Same

The canal extends from a six-fathom line in Colon harbor on the Atlantic to a six-fathom line off Panama on the Pacific. The first 16 miles from the Atlantic to Bohio is a tide level canal. At Bohio a dam will be thrown across the Chagres River. This dam will be of sufficient height to form a lake in the valley of the Chagres, whose surface will be 90 feet above sea level and whose area will be sufficient to provide for all overflow in the rainy season. At this point there will be a set of locks whose combined lift will be 90 feet. From these locks the canal traverses Lake Bohio for 14 miles. There

## Pan-American Exposition

are two sets of locks at the Pacific terminus of the summit level, 8½ miles from the Pacific terminus.

The effect of the Panama Canal on the world's commerce will probably exceed the anticipation of those who were the most influential in securing the passage of the measures by which its construction is assured. Its strategic importance is even greater than that of the Suez Canal and its opening will change many of the ocean routes of the world. It will also constitute a waterway which will become a strong competitor of our transcontinental railway lines and probably it will divert from them a considerable portion of the transcontinental traffic.

From a national point of view, the completion of this canal will be invaluable, as it will give us ready water communication between the Atlantic and Pacific coasts and also place Hawaii and the Philippine Islands, in point of communication, several thousand miles nearer the seat of government than they now are.

**Pan-American Congress.**—Owing to the efforts of James G. Blaine, delegates from the republics of Mexico and the Central and South American states assembled at Washington, October 2, 1889, for the purpose of discussing the formation of an American Customs Union, under which the trade of American nations with each other might be maintained. The congress continued without final adjournment for five months, and voted to recommend the establishment of regular communications between the ports of the several American states, from trade and customs regulations, weights and measures, patent, copyright, and trademark laws, a common legal tender silver coin, and a plain arbitration of all questions and disputes. It adjourned April 19, 1890.

**The Congress of 1901-1902.**—The second Pan-American Congress, embracing all the American republics, convened in the city of Mexico, Oct. 22, 1901. The body organized by electing Lic. Genaro Raijosa, delegate from Mexico, president, and Jose Hyanos, of Brazil, first vice-president.

The main purposes of this congress were the same as those of the former convention. Reciprocity treaties and the formation of some definite plan for the arbitration of all difficulties and disputes between the signatory powers occupied the greater portion of the time. Plans for the construction of a railway to connect North and South America, for the establishment of a standard coin which shall be legal tender in all the countries represented, for a uniform system of quarantine, and, in general, for bringing the American Republics closer together in all their relations and interests were recommended. A plan for arbitration based on that of the "Peace Congress at the Hague" (which see) was adopted. The congress adjourned Jan. 31, 1902. See *Bureau of American Republics*.

**Pan-American Exposition,** an exposition held at Buffalo, N. Y., from May to November, 1901, to show the progress made by the American Republics during the 19th century.



## Pan-American Exposition

The Pan-American Exposition Company was incorporated in 1897, but the breaking out of the war with Spain caused an indefinite postponement of the enterprise. In March, 1898, the company perfected its organization, elected a board of directors, and secured the approval of the City of Buffalo and the State of New York. The organization contained twenty-five directors and the following officers: President, John G. Milburn; Secretary, Edwin Flemming; Treasurer, George L. Williams; Chairman Executive Committee, John L. Satcherd; Director-General, William I. Buchanan. The United States Government appropriated \$500,000 for special exhibits, and most of the states made appropriations for state buildings and special state exhibits; aside from this the expense of the exposition, amounting to \$10,000,000, was assumed by the citizens of Buffalo. The gates were opened to the public on May 1, but the exposition was not formally opened until May 20. Eighteen countries, including Cuba and Hayti, made exhibits. Venezuela, Paraguay, and Uruguay were not represented. The exposition was closed on Nov. 2. The total attendance was 8,334,803. The stockholders suffered a loss of about \$3,000,000.

Architecturally the Pan-American Exposition will have an abiding place in American history. Within an area of 550 acres was brought together an array of landscape, buildings, statuary, and color such as has not before been seen in America, if in the world. The architecture was of the styles common in the South American countries, and belonged to the more modern ornate Renaissance. The only exception to this was the Electric Tower, which was essentially American, and of a more simple and classic style. It had a height of 409 feet. The harmonious blending of the colors used in decorating the buildings created the "Rainbow City," remarkable for its brightness and beauty. The greatest success of the Exposition, however, was in the plan adopted for lighting the buildings and grounds. Never before has such an opportunity been offered for the display of electric lights, since the exposition could make use of the great power plant at Niagara Falls for its source of electricity, and never before has such a display of artificial lighting been made. By using a large number of incandescent lights of low candle power, the light was evenly diffused, strong shadows avoided, and a most beautiful effect produced. The Electric Tower, which was the focus of the architectural and lighting scheme, contained 40,000 incandescent lamps and 100 search lights, while 200,000 incandescent lights were employed to light the Esplanade and Court of Fountains. The installation of these lights required over 400 miles of wire, weighing 250 tons.

**Panay**, an island of the Philippines, between Mindoro and Negros. It is of triangular form, about 100 mi. broad and 100 mi. long. It is mountainous but very fertile, and the inhabitants have made considerable progress in civilization. Capital Iloilo. Pop. 799,816.

## Papal States

**Pando'ra**, in Greek mythology, the first woman on earth, sent by Zeus to mankind in vengeance for Prometheus's theft of heavenly fire. Each of the gods gave her some gift fatal to man. According to later accounts the gods gave her a box full of blessings for mankind, but on her opening the box they all flew away, except hope.

**Pan'iput**, a town of India in the Punjab, 50 mi. n. by w. of Delhi; surrounded by an old wall. Pop. 25,022.

**Pantheism**, in philosophy, the doctrine of the substantial identity of God and the universe, a doctrine that stands midway between atheism and dogmatic theism. The origin of the idea of a God with the theist and pantheist is the same. It is by reasoning upon ourselves and the surrounding objects of which we are cognizant that we come to infer the existence of some superior being upon whom they all depend, from whom they proceed, or in whom they subsist. Pantheism assumes the identity of cause and effect. Matter, not less than mind, is with it the necessary emanation of the Deity. The unity of the universe is a unity which embraces all existing variety, a unity in which all contradictions and all existing and inexplicable congruities are combined. Pantheism has been the foundation of nearly all the chief forms of religion which have existed in the world. It was represented in the East by the Sankhya of Kapila, a celebrated system of Indian philosophy. The Persian, Greek, and Egyptian religious systems were also pantheistic. Spinoza is the most representative pantheist of modern times. A twofold division of pantheism has been proposed: 1. That which loses the world in God, one only being in whose modifications are the individual phenomena. 2. That which loses God in the world and totally denies the substantiality of God.

**Pantheon** (or pan-the'on), a celebrated temple at Rome, built in 27 B. C. by Marcus Agrippa. It is a large edifice of brick, built in circular form, with a portico of lofty columns. It has the finest dome in the world (142½ ft. internal diameter, 143 ft. internal height), and its portico is almost equally celebrated. It is now a church, and is known as Santa Maria Rotonda. Raphael and other famous men are buried within its walls. The Pantheon in Paris, for some time the church of St. Geneviève, is a noble edifice with a lofty dome, devoted to the interment of illustrious men.

**Panther**, one of the Felidae or Cat tribe, of a yellow color, diversified with roundish black spots, a native of Asia and Africa. The panther is now supposed to be identical with, or a mere variety of, the leopard. The name panther is given to the puma in this country.

**Papacy**. See *Pope*.

**Papal States**, the name given to that portion of Central Italy of which the pope was sovereign by virtue of his position. The territory extended irregularly from the Adriatic to the Mediterranean, and latterly comprised an area of 15,289 sq. mi. with 3,126,000 inhabitants. Rome was the capital. See *Pope*.

**Paper**, a thin and flexible substance, manufactured principally of vegetable fiber, used for writing and printing on, and for various other purposes. Egypt, China, and Japan are the countries in which the earliest manufacture of paper is known to have been carried on. The Egyptian paper was made from the papyrus (whence the word *paper*), but this was different from paper properly so called. According to the Chinese the fabrication of paper from cotton and other vegetable fibers was invented by them in the second century B.C. From the East it passed to the West, and it was introduced into Europe by the Arabs. Spain is said to have been the first country in Europe in which paper from cotton was made, probably in the eleventh century; and at a later period the manufacture was carried on in Italy, France, and Germany. It cannot now be ascertained at what time linen rags were first brought into use for making paper; but remnants of Spanish paper of the twelfth century appear to indicate that attempts were made as early as that time to add linen rags to the cotton ones. The earliest paper manufactory known to have been set up in England was that of John Tate, at Stevenage, in Hertfordshire, about 1495. The manufacture in England, however, long remained in a backward state, so that until late in the eighteenth century the finer qualities of paper were imported from France and Holland.

After the introduction into Europe of cotton and linen rags as materials for paper-making, other vegetable fibers were for many centuries almost entirely given up, rags being cheaper than any other material. It was only about the close of the eighteenth century that paper manufacturers again began to turn their attention to the possibility of using vegetable fibers as substitutes for rags, one of the earliest signs of the new departure being a work containing sixty specimens of paper made from different vegetable materials, published in 1772 by a German named Schöffer or Schäffers. Straw, wood, and esparto are the chief vegetable fibers which have been found most suitable for the purpose.

The process by which paper is produced depends on the minute subdivision of the fibers, and their subsequent cohesion; and before the making of paper properly begins the rags or other materials have to be cleaned from impurities, boiled in a strong lye, and reduced by special machinery to the condition of a thin pulp, being latterly bleached with chloride of lime. It is at this stage of the manufacture that size is added, and toned and other colored papers have the coloring matter introduced. The pulp, composed of the fibrous particles mixed with water, is now ready to be made into paper.

**Wood-pulp Paper.**—Wood pulp is made from the spruce tree. The logs are brought to the wood-pulp mill and cut into short lengths from 16 in., to 4 ft. long. The bark is removed before it is ground into pulp. The wood is then carried to the grinder. The grindstone is about 2 ft. thick. The log is held by hy-

draulic pressure against the stone, and water is put on the stone to keep the wood from burning. The stone rubs or grinds the log into a pulp, which falls down on a screen, where the splinters and slivers are caught, the fine pulp passing through the meshes. A pump sucks up the pulp through the vat to a brass plate, which is perforated with small holes. The pulp is really a liquid, capable of being pumped or carried in a stream from place to place, and it is next pumped upon what is known as the "wet machine." It is then spread on a woolen blanket, where some of the water is pressed out of it, and it is left in layers which are called "laps." In this condition it looks like a newspaper, which after being soaked in water is squeezed in the hand. It is solid enough to be carried about, and the layers are made into bundles which weigh about 100 pounds. In this condition it is shipped to the paper mill.

Paper made entirely of wood pulp would not be strong enough to stand the wear and tear of printing presses. The grinder breaks up the fibers so that the paper would not hang together in passing over the tapes, through the rolls and cylinders and folders. To give the paper strength, it has been the custom to add rags, flax, cotton waste, and other fibers to the wood pulp. Most of the newspapers nowadays are made entirely of wood pulp, and what is known as sulphite fiber has taken the place of other fibers. This fiber is really wood pulp, but is not made by grinding, and the fibers therefore are not broken up. The sulphite is made by boiling the wood in a large boiler with steam and a product of sulphur. The wood is disintegrated into fibers which retain their full length. The wood pulp and sulphite are mixed together in proper proportions, and, after they are thoroughly mixed, colored, and sized, the pulp becomes "half stock," and is pumped into tanks or vats, and then upon screens which catch any foreign substance which might be in the material. It is then ready for the paper machine. Here the pulp is spread over an endless mesh or screen which carries it toward the cylinders and rollers which make the finished paper. As the watery pulp goes toward the rolls, the screen vibrates and the water drops through and leaves the pulp a broad sheet of mushy paper. This sheet passes over perforated plates through which the remaining water is sucked by pumps. It is passed between rollers which press it into a more compact condition, and make it stronger. Again it is passed over rolls which squeeze it and deliver it to an endless belt of felt, which carries it over and under large cylinders heated by steam, and finally feeds it into the "calender" rolls, where the paper is smoothed and pressed into the finished product. From the last stock of calenders the paper is made into rolls and is then shipped to the newspapers ready for the presses.

**Linen Paper.**—Some wood-pulp paper is used in making cheap books, but the best books and writing paper and ledger paper are made from linen rags. These rags are brought to the mill just as they are gathered and are run

## Paper

through a machine which shakes out all the dust and dirt. They are then carefully picked over and all the linen rags are taken out, buttons cut off, and they are ripped up into small pieces. From the rag-room the rags go to the cutters where they are sliced by machinery into tiny bits and they are then boiled in lime water to remove the color. They are then ground to a pulp and the rags become "half stock." After being whitened by bleaching, the half stock is taken to the beating machine which completes the pulping process, and it is then taken to the paper machine. In the wood-pulp paper machine the paper is not water marked, but the linen-paper makers brand their product. This is done when the paper sheet passes under the roll of the machine, just before it passes over the perforated brass plates through which the remaining water is sucked. This roll, known as the "dandy roll," is covered with a brass wire, and the design formed by the wires, whether letters or trademark, is made on the paper as it passes under the roll. If a series of parallel marks is made, the paper is called wove or laid. From the dandy roll on the process of finishing the paper is similar to that used in making wood-pulp paper. The hand-made papers are made by dipping the pulp from a vat with a sieve. The water runs through the sieve, and the solid pulp spread in a thin sheet is left on the bottom. The sieve is turned upsidown and the sheet is dropped on a board. The paper is then finished by passing it between smooth, heavy iron rollers. Paper is used for car wheels, barrels, buckets, boats, tubs, clothing, and even paper horseshoes. Boards and planks are made of paper. They can be sawed like wood and made into buildings. Paper is molded into picture frames and architectural decorations, and artificial leather is made of paper chemically treated.

Paper was made from straw at the beginning of the present century, and the material is now largely used. The chief and best use of straw is to impart stiffness to common qualities. To prevent brittleness, however, it is necessary to destroy the silica contained in the straw by means of strong alkali. Paper is now also made entirely from wood, previously reduced to a pulp. Esparto or Spanish grass, exported largely from Spain, Algeria, Tripoli, Tunis, and other countries, has been applied to paper making only in comparatively recent years, but has risen rapidly into favor. The use of rushes for paper making belongs to America, and dates from the year 1866. The root of the lucern has also been applied with success in France of late years to the fabrication of paper. Various mineral substances are sometimes added to the fibrous materials necessary to make paper, such as a silicate of alumina called Lenzinite, kaolin or porcelain earth, and artificial sulphate of barium (permanent white). The first two substances diminish the tenacity of the fabric; the last is thought by some manufacturers to be beneficial to printing papers, enabling them to take a clearer impression from the ink.

## Paper Hangings

Blotting and filtering paper are both made in the same way as ordinary paper except that the sizing is omitted. Copying paper is made by smearing writing paper with a composition of lard and black lead, which, after being left alone for a day or so, is scraped smooth and wiped with a soft cloth. Incombustible paper has been made from asbestos, but since fire removes the ink from a book printed on this material, the invention is of no utility, even though the paper itself be indestructible. Indelible check paper has been patented on several occasions. In one kind of it the paper is treated with an insoluble ferrocyanide and an insoluble salt of manganese, and is sized with alumina instead of alum. Parchment paper or vegetable parchment is made from ordinary unsized paper by treatment with sulphuric acid or oil of vitriol and ammonia. The so-called rice paper is not an artificial paper, but a vegetable membrane imported from China, and obtained apparently from the pith of a plant called *Aralia papyrifera*. Tissue paper is a very thin paper of a silky softness used to protect engravings in books and for various other purposes. Tracing paper is made from tissue paper by soaking it with Canada balsam and oil of turpentine or nut oil and turpentine.

In recent times the uses of paper have greatly multiplied. Besides being largely employed for making collars, cuffs, and other articles of dress, it is sometimes used for making boats, pipes, and tanks for water; cuirasses to resist musket bullets, wheels for railway carriages, and even bells and cannons. Paper wheels have been used for some of Pullman's railway saloon cars, and have worn out one set of tires. Cannons made of paper have actually been tried with success. The dome of the new observatory at Greenwich is made of papier-maché. In the production of paper America, England, Germany, and France take the lead.

**Paper Hangings**, ornamental papers often pasted on the walls of the rooms in dwelling houses. The staining of papers for this purpose is said to be a Chinese invention, and was introduced into France at the beginning of the seventeenth century. It is now common everywhere, but more especially in the U. S., France and England. Most of the processes in paper staining are now usually done by machinery; but there is still much handwork in the finer qualities. The first operation is that of grounding, which consists in covering the surface with some dull color, the tint of which varies. Papers with a glazed ground are usually glazed immediately after receiving the ground tint. The designs on the surface of paper hangings are applied by hand processes and machines exactly similar to those employed in calico printing. *Flock paper* is made by printing on the parts which are to receive the flock a mixture of strong oil boiled with litharge and white lead, to render it drying. The colored flock is then sprinkled on the paper, and adheres to the parts to which the mixture has been applied.



## Paphos

**Pa'phos**, the name of two ancient cities in Cyprus—Old Paphos, a little more than a mile distant from the southwestern coast, upon a height, and New Paphos (modern *Baffa*), 7 or 8 mi. to the n.w. of old Paphos, situated on the sea shore. The first was famous in antiquity for the worship of Aphroditē (Venus). At New Paphos St. Paul preached before the proconsul Sergius.

**Papier Mâché** (páp-yā mā-shā), a substance made of cuttings of white or brown paper boiled in water, and beaten in a mortar till they are reduced into a kind of paste, and then boiled in a solution of gum arabic or of size to give tenacity to the paste. Sulphate of iron, quicklime, and glue or white of egg, are sometimes added to enable the material to resist the action of water, and borax and phosphate of soda to render it to a great extent fireproof. The uses to which papier mâché is put are almost limitless. Hollow telegraph poles made of paper pulp have been recently invented, and paper is taking the place of gutta-percha in the insulation of electric wires. Cigar boxes are made from thin paper board and are then scented with oil of cedar and colored and grained to imitate Spanish cedar. Straws for lemonade and other iced drinks are made of paper which is coated with paraffin to make the straws water tight. Rims for bicycles are made of paper pulp which has been subjected to tremendous hydraulic pressure. Paper is used in making stage furniture, armor, statues, and other accessories of scenic productions. When papier mâché is fully dry it is hard, tough, and light and can be painted any color, nailed, sawed, marbled, bronzed, silvered, and fitted to place and will not crack as do wood, terra cotta, and plaster.

**Papillæ**, the name applied in physiology to small or minute processes protruding from the surface of the skin, or of membranes generally, and which may possess either a secretory or other function. The human skin exhibits numerous papillæ, with divided or single extremities, and through which the sense of touch is chiefly exercised. The papillæ of the tongue are important in connection with the sense of taste.

**Papinia' nus**, ÆMILIUS (PAPINIAN) (140-212), Roman lawyer, b. under Antoninus Pius. His learning and integrity won him the first offices of state, and he was ultimately chosen prefect of the prætorian guards under the Emperor Septimius Severus, whom he accompanied to Britain. The Emperor Caracalla caused him to be executed.

**Papy'rus**, an aquatic plant which has acquired celebrity from furnishing the paper of the ancient Egyptians. The root is very large, hard, and creeping; the stem is several inches thick, naked, except at the base, 8 to 15 or

## Pará

more ft. high, triangular above, and terminated by a compound, wide spreading, and beautiful umbel, which is surrounded with an involucre composed of eight large sword-shaped leaves. The little scaly spikelets of inconspicuous flowers are placed at the extremity of the rays of this umbel. Formerly it was extensively cultivated in Lower Egypt, but is now rare there. It is abundant in the equatorial regions of Africa in many places, and is found also in Western Africa and in Southern Italy. The inhabitants of some countries where it grows manufacture it into various articles, including sail cloth, cordage, and even wearing apparel and boats. Among the ancient Egyptians its uses were equally numerous, but it is



Papyrus.

best known as furnishing a sort of paper. This consisted of thin strips carefully separated from the stem longitudinally, laid side by side, and then covered transversely by shorter strips, the whole being caused to adhere together by the use of water and probably some gummy matter. A sheet of this kind formed really a sort of mat. In extensive writings a number of these sheets were united into one long roll, the writing materials being a reed pen and ink made of animal charcoal and oil. Thousands of these papyri or papyrus rolls still exist (many of them were found in the ruins of Herculaneum), but their contents, so far as deciphered, have only been of moderate value.

**Pará** (or Belem), a city and seaport in Brazil, capital of the province of Pará, on the right bank of the estuary of the Pará. The principal buildings are the governor's palace, the cathedral, and the churches of Santa Anna and São João Baptista. It is the seat of the legislative assembly of the province. The port, defended by forts, is capable of admitting vessels of large size. The principal exports are caoutchouc, cacao, Brazilnuts, copaiba, rice, piass-

## Paracelsus

sava, sarsaparilla, annotto, cotton, etc. Pop. est. at from 55,000 to 60,000. The province of Pará, the most northerly in Brazil, comprises an area of 443,790 sq. mi. on both sides of the lower Amazon, and consists chiefly of vast alluvial plains connected with this river and its tributaries. These latter comprise the Tapajos and the Xingu, besides many others; the Tocantins being another great stream from the south. The province possesses immense forests, and is extremely fertile, but there is little cultivation, the inhabitants being fewer than one to the square mile. The trade centers in the capital. It is now facilitated by steamboats navigating the Amazon and Tocantins. Pop. 443,653.

**Paracel'sus** (or PHILIPPUS AUREOLUS THEOPHRASTUS BOMBASTUS VON HOHENHEIM) (1493-1541), empiric and alchemist, b. at Einsiedeln, in the canton of Schwyz, in Switzerland. In the course of his travels he became acquainted with remedies not in common use among physicians, by means of which he performed extraordinary cures, and obtained great reputation. In 1526 he accepted the chair of medicine offered him by the magistrates of Basel, and lectured there till the spring of 1528. He died at the hospital of St. Sebastian at Salzburg. For a long time he was regarded as little better than a charlatan, but he enriched science, particularly chemistry and medicine, with some valuable discoveries.

**Parachute** (pa'ra-shōt), an apparatus of an umbrella shape and construction, usually about 20 or 30 ft. in diameter, attached to balloons, by means of which the aeronaut may descend slowly from a great height. It is shut when carried up, and expands of itself when the aeronaut begins to descend; but it is not altogether to be depended on, and accidents in connection with its use have been frequent. The earliest mention of a machine of this kind is in a MS. describing experiments made with one in 1617. In 1783 the French physician Lenormand made several further experiments at Montpellier; and shortly after the machine became well known through the descents of Blanchard in Paris and London.

**Paradise**, the garden of Eden. The word is originally Persian, and signifies a park. It was introduced into the Greek language in the form of *paradeisos* by Xenophon, and has been introduced into modern languages as a name for the garden of Eden.

**Par'affin**, a solid white substance of a waxy appearance which is separated from petroleum and ozokerit, and is also very largely obtained by the destructive distillation of various organic bodies, such as brown coal or lignite, bituminous coal, shale, etc. The process generally consists in heating bituminous shale in iron retorts at a low red heat; condensing the tarry products, and purifying these by distillation, washing successively with soda, water, and acid, and again distilling. Those portions of the oil which solidify in the final distillations are collected separately from the liquid portions, washed with soda and acid, and crystallized or again distilled. The par-

## Paraguay

tially purified paraffin is now again treated with acid, allowed to solidify, submitted to the action of centrifugal machines, and finally strongly pressed in order to remove any liquid oil which may still adhere to it. The refined paraffin is largely manufactured into candles, which may be either white or colored, and may be mixed with a certain quantity of wax, etc. The liquid oils obtained in the process come into commerce under the general name of paraffin oil, the lighter oils being used for illuminating and the heavier for lubricating purposes. The operations of the oil refinery are; 1, distillation, 2, the treatment with chemicals, 3, cooling and pressing the heavy oil containing paraffin so as to separate the solid hydrocarbons from the liquid. The oils are distilled several times and are fractionated into the various qualities required; and between each distillation the oil is treated with oil of vitriol and with caustic soda. After the finishing treatment with acid and soda some of the soda compounds are retained in solution by the oil; these have to be carefully removed by washing with water. The absence of acid and alkaline compounds, and thorough fractionation of the oil, are the great secrets in the refining of burning oils. Besides being used for candles, it is used for vestas and tapers, for water-proofing, sizing and glazing fabrics, as an electric insulator, as a coating for the inside of beer barrels, etc.

**Paraguay** (pá'râ-gwî), a republic of South America, surrounded by the Argentine Republic, Brazil, and Bolivia; separated from the first by the Paraná River, its tributary the Paraguay, and the Pilcomayo, a tributary of the latter; from Brazil by the Paraná, a range of hills, and the Apa, a tributary of the Paraguay; area 98,000 sq. mi. The whole surface belongs to the basins of the Paraguay and Paraná, numerous tributaries of which intersect the country. Along the Paraguay and in the south, adjoining the Paraná, are extensive swampy tracts; westward of the Paraguay the country is little known. Elsewhere the surface is well diversified with hill and valley, and rich alluvial plain. The climate is agreeable, the mean annual temperature being about 75°. The natural fertility of the soil is shown by a vegetation of almost unequalled luxuriance and grandeur. In the forests are found at least sixty varieties of timber trees, besides dyewoods, gums, drugs, perfumes, vegetable oils, and fruits. Many of the hills are covered with the *yerba maté* or Paraguay tea. The larger plains are roamed over by immense herds of cattle, which yield large quantities of hides, tallow, bones, etc.; and on all the cultivated alluvial tracts sugar cane, cotton, tobacco, rice, maize, etc., are raised in profusion. In 1891 the imports were valued at \$1,802,000; the exports were valued at more than \$3,166,000, and comprised mainly maté and tobacco. Asuncion, the capital, Paraguari, and Villa Rica are connected by a railway about 90 mi. long. Large river steamers ascend the Paraná and the Paraguay far above Asuncion.

Paraguay was originally a Spanish colony, the



## Paraguay

first settlement being made in 1535. In 1608 a number of Spanish Jesuits established a powerful and well organized government, which lasted till 1758, when it was overthrown by the Brazilians and Spaniards. Early in the present century its isolated position enabled it by a single effort to emancipate itself from Spanish rule. Dr. Francia, secretary to the revolutionary junta in 1811, was elected consul, but exchanged the name for that of dictator in 1814, and thenceforward, by a rigorous system of espionage and the strict prohibition of all intercourse with other nations, retained his position till his death in 1840 at the age of eighty-four. In 1844 Don Carlos Antonio Lopez was elected president for ten years, and soon after the country was declared free and open both to foreigners and foreign commerce. Don Carlos Lopez remained president of Paraguay till his death in 1862, when he was succeeded by his son Don Francisco, who concluded treaties of commerce with the U. S., England, France, Brazil, etc., and did all in his power to promote the growth of agriculture and industry in the land. But a disastrous war with Brazil and the Argentine Republic, which broke out in 1864 and only closed with the death of Lopez in 1870, caused the death of far the greater portion of the male adults and entirely checked the progress of Paraguay. A popular constitutional government has since been established, and the state is now making rapid progress in population and prosperity. The people are largely half-breeds or of Indian blood. Before the war the population is said to have been over 1,000,000; after the war not more than a tenth of this. Pop. est. 1901, 700,000.

**Paraguay**, a river of South America, which rises in the Brazilian province of Matto Grosso, takes a course generally southward, and joins the Paraná at the southwest angle of the state of Paraguay after a course of some 1,300 mi. It receives the Pilcomayo, Vermejo, and other large rivers, and is a valuable highway of trade to Paraguay and Brazil.

**Parahyba** (pá-rá-ē' bá), a maritime province of Brazil, between Rio-Grande-do-Norte on the north and Pernambuco on the south; area 28,846 sq. mi. Much of the soil is of a sandy texture, though there are also extensive fertile tracts and large forests. Periodical droughts occur. Pop. 496,618. The capital, Parahyba, is a cathedral city situated on the river of the same name, about 11 mi. from its mouth. The harbor is much frequented by coasting vessels. Pop. 40,000.

**Parakeets** (or Parroquets), a sub-family or group of the Parrots characterized by their generally small size and their long tail feathers. The islands of the Eastern Archipelago form the chief habitat of these birds, but species also occur in India and Australia. Among the most familiar forms are the rose-ringed and Alexandrine parakeets. The former found in India and on the eastern coasts of Africa, has a bright green body and a pink circle round the neck. The Alexandrine parakeet of India is a nearly allied species. These

## Paraná

birds may be taught to speak with distinctness. The ground parakeets of Australia live among the reeds and grass of swamps, generally in solitary pairs. The common ground parakeet of Australia possesses a green and black plumage, the tail being similarly colored, and the body feathers having each a band of dark brown hue. The grass parakeets of Australia, of which the small warbling parakeet is a good example, inhabit the central flat lands of Australia, and feed on the seeds of the grasses covering the plains. They perch on the eucalypti or gum trees during the day, and the nests are situated in the hollows of these trees. Contrary to most parrots they have an agreeable voice.

**Parallel Motion**, a mechanical contrivance employed by Watt to communicate the alternate pushes and pulls of the piston rod of a steam engine to the end of a vibrating beam, and which prevents the action of forces tending to destroy the right-line motion of the piston rod. The motion given to the end of the rod is not accurately in a straight line, but it is very nearly so. Watt's parallel motion is still employed in all stationary beam engines. In marine beam engines the arrangement employed differs somewhat in form, but is the same in principle as Watt's contrivance.

**Parallelogram of Forces**, an important dynamical principle, deduced by Newton, which may be stated thus: If two forces acting in different directions on a particle at the same time be represented in magnitude and direction by two straight lines meeting at the particle, their resultant effect in giving motion to the particle is that of a force represented in magnitude and direction by the diagonal of the parallelogram, of which the two former lines are two sides.

**Paramari'bo**, the capital of Dutch Guiana or Surinam, about 18 mi. above the mouth of the river Surinam, which is navigable for vessels of considerable size. It is the center of the Dutch West Indian trade, and exports sugar, coffee, etc. Pop. 28,831.

**Paraná**, a river in South America, the largest except the Amazon, and draining a larger basin than any other river in the Western Hemisphere except the Amazon and the Mississippi. It is formed by the junction of two streams, the Rio Grande and the Parnahyba which meet in Brazil, and it discharges itself into the estuary of the La Plata, its course latterly being through the Argentine Republic. Its principal tributaries are the Paraguay and the Salado, both from the right. All the tributaries on its left are comparatively short. Its length from its sources to its junction with the Paraguay is probably 1,500 mi., and thence to the sea 600 mi. more. In breadth, current, and volume of water, the Paraná has ten times the magnitude of the Paraguay, which is itself superior to the greatest European rivers. It is an important waterway to the interior of the country, though with obstructions at certain points.

**Paraná**, a province of Southern Brazil, having on the n. the province of São Paulo, e. the



## Paraphernalia

Atlantic, s. the province of Santa Catharina, and w. Paraguay and the province of Matto Grosso; area 85,429 sq. mi. Its chief town is Curitiba. Pop. 187,548.

**Paraphernalia**, in law, a woman's apparel, jewels, and other things, which, in the lifetime of her husband, she wore as the ornaments of her person, and to which she has a distinct claim.

**Parasites**, the name applied to animals which attach themselves to the exterior, or inhabit various situations in the interior, of the bodies of other animals, including such forms as tapeworms, flukes, scolices or hydatids, fish lice, bird lice, common lice, etc. True parasites obtain their nourishment from the animals on which they live, and there is another class of parasites that only obtain a lodging or abode at the expense of the animals they accompany.

**Parasitic Diseases**, such as are produced by parasitic animals or plants. Among the animals producing such diseases are the guinea worm, the louse, the trichina, tapeworms, etc. The vegetable parasites which produce disease in animals are either fungi or algæ. Ringworm is an example of this class of diseases.

**Parasitic Plants**, such plants as grow on others, from which they receive their nourishment. In this class are many fungi, such as the *Uredo caries*, which produces the formidable disease called bunt to which wheat is liable. Among larger parasites are the mistletoe; and the genus *Rafflesia*, belonging to Sumatra and Java. Parasites are distinguished from *epiphytes*, inasmuch as the latter, though they grow upon plants, are not nourished by them.

**Parchment**, the skins of sheep, she-goats, and several other animals, so dressed or prepared as to be rendered fit for writing on. This is done by stretching the skin on a frame, separating all the flesh and hair from the skin, reducing its thickness with a sharp instrument and smoothing the surface with a pumice-stone covered with pulverized chalk or slaked lime. After it is reduced to something less than half its original thickness, it is smoothed and slowly dried for use.

**Pardee**, ARIO (1810-1892), coal operator and philanthropist, b. in Chatham, N. Y. One of the pioneers of the Pennsylvania anthracite region, he amassed several millions as a coal operator. His donations to Lafayette College amounted to \$500,000. He was active in various charitable movements.

**Pardon**, the remission of the penalty of a crime or offense. In the U. S. the pardoning power is lodged in the president and the governors of the various states, and extends to all offenses except those which are punished by impeachment after conviction. In some states concurrence of one of the legislative bodies or of a pardoning board is required.

**Pare** (pâ-râ), AMBROISE, the father of French surgery, b. early in the sixteenth century at Laval; studied at Paris. He acted for a time as an army surgeon, and in 1552 he became surgeon to Henry II, under whose successors he held the same post.

## Pari passu

**Parent and Child**, besides being a natural relationship, has its legal aspects, in which legitimacy and illegitimacy form a clear distinction. All children born in lawful wedlock, or within a satisfactory time afterward, are considered legitimate; but the common law does not compel parents to maintain their children. If the parents fail to do so, however, in the case of a child unable to earn its own living, the poor law authority performs this duty, and by so doing can obtain the power, under an order from a justice of the peace, to compel the parents or other relatives to make a contribution for that purpose. Beyond this there is no legal provision for the maintenance of children by their parents; yet where the child contracts a debt, as for food, clothes, or education, the parents will usually be found liable. When the children are legitimate, it is provided by the common law that the father shall have them under his power until their majority; but it is now possible for the mother to apply to the courts for rights of access and custody while the children are within sixteen years of age. The latter right is usually granted when the father is shown to be a person of immoral character. At death parents may, under proper will, disinherit their children; but in the event of intestacy the children's share of the personal property is divided equally among them, while real estate falls to the heir.

**Parenthesis** (pl. Parentheses), an explanatory or qualifying sentence, or part of a sentence, inserted into the midst of another sentence without being grammatically connected with it. It is generally marked off by upright curves ( ), but frequently by dashes —, and even by commas.

**Parhelion**, a mock sun, having the appearance of the sun itself, and seen by the side of that luminary. Parhelia are sometimes double, sometimes triple, and sometimes more numerous. They appear at the same height above the horizon as the true sun, and they are always connected with one another by a white circle or halo. They are the result of certain modifications which light undergoes when it falls on the crystals of ice, rain drops, or minute particles that constitute suitably situated clouds. Parhelia which appear on the same side of the circle with the true sun are often tinted with prismatic colors.

**Pa'ria**, GULF OF, an inlet of the Atlantic on the northeast coast of South America, between the island of Trinidad and mainland of Venezuela, inclosed on the north by the Peninsula of Paria. It possesses good anchorage, and receives arms of the Orinoco.

**Parian Marble**, a mellow tinted marble, highly valued by the ancients, and chosen for their choicest works. The principal blocks were obtained from Mount Marpassus, in the island of Paros.

**Pari passu**, in law, a term signifying equally in proportion, without preference; used especially of the creditors of an insolvent estate who (with certain exceptions) are entitled to payment of their debts in shares proportioned to their respective claims.

## Paris

**Paris**, Edgar co., Ill., on Sugar Creek. Railroads: C. C. C. & St. L.; St. Louis division and Cairo division Vandalia; T. H. & P. division. Industries: five flouring mills, broom company, three iron foundries, broom-corn machinery, and carriage factory. Coal in vicinity. Surrounding country agricultural. The town was first settled in 1823, and became a city in 1871. Pop. 1900, 6,105.

**Paris**, the capital of France and of the department of the Seine. The city lies in the Seine valley surrounded by heights. Through the valleys, the river runs from east to west, enclosing two islands, upon which part of the city is built. It is navigable by small steamers. The quays or embankments, which extend along the Seine on both sides, being built of solid masonry, protect the city from inundation, and form excellent promenades. The river, 530 ft. in width, is crossed by numerous bridges. The city is surrounded by a line of fortifications which measures 22 mi.; outside of this is the enceinte, while beyond that again are the detached forts. These now form two main lines of defense. The inner line consists of sixteen forts, the outer line of eighteen forts besides redoubts; the area thus enclosed measuring 430 sq. mi., with an encircling line of 77 mi. The climate of Paris is temperate and agreeable. The city is divided into twenty *arrondissements*, at the head of each of which is a *maire*. Each *arrondissement* is divided into four quarters, each of which sends a member to the municipal council. The council discuss and vote the budget of the city. At the head is the prefect of the Seine and the prefect of police. The water supply of the city is derived from the Seine and the Marne, from the Ourcq Canal, from artesian wells, and from springs. The houses of Paris are almost all built of white calcareous stone, and their general height is from five to six stories, arranged in separate tenements. In the older parts of the city the streets are narrow and irregular, but in the newer districts the avenues are straight, wide, and well paved. What are known as "the boulevards" include the interior, exterior, and military. That which is specifically called *The Boulevard* extends, in an irregular arc, on the north side of the Seine, from the Place de la Bastille in the east to the Place de la Madeleine in the west. Here may be noted the magnificent triumphal arches of Porte St. Denis and Porte St. Martin, the former of which is 72 ft. in height. On the south side of the Seine the boulevards are neither so numerous nor so extensive. The exterior boulevards are so named because they are outside the old *mur d'octroi*; and the military boulevards, still further out, extend round the fortifications. There are six passenger stations for the railways to the various parts of the country, and a railway around the city. There are also tramway lines to Versailles, St. Cloud, and other places in the suburbs. The most notable public squares or *places* are the Place de la Concorde, one of the largest and most elegant squares in Europe; Place de l'Etoile, in which is situated the Arc

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de Triomphe; the Place Vendôme, with column to Napoleon I; Place des Victoires, with equestrian statue of Louis XIV, etc. Within the city are situated the gardens of the Tuileries, which are adorned with numerous statues and fountains; the gardens of the Luxembourg, in which are fine conservatories of rare plants; the Jardin des Plantes; and others. The most extensive parks are outside the city. Of these the Bois de Boulogne, on the west, covers an area of 2,150 acres, gives an extensive view toward St. Cloud and Mont Valérien, comprises the race courses of Longchamps and Auteuil, and in it are situated lakes, an aquarium, conservatories, etc. The Bois de Vincennes, on the east, even larger, is similarly adorned with artificial lakes and streams, and its high plateau offers a fine view over the surrounding country. The most celebrated and extensive cemetery in Paris is Père la Chaise (106½ acres), finely situated and having many important monuments. The Catacombs are ancient quarries which extend under a portion of the southern part of the city.

Of the churches of Paris the most celebrated is the Cathedral of Notre Dame, situated on the islands of the Seine. It is a vast cruciform structure, with its lofty west front flanked by two square towers, the walls sustained by many flying buttresses, and the eastern end octagonal. The church of La Madeleine, a modern structure, stands on an elevated basement fronting the north end of the Rue Royale. Others are the church of St. Geneviève, set apart under the title of the Pantheon, as the burying place of illustrious Frenchmen; St. Eustache; St. Germain l'Auxerrois; St. Gervais; St. Roch; St. Sulpice; etc. On the very summit of Montmartre is the Church of the Sacred Heart. The Protestant churches are the Oratoire and Visitation, and chapels belonging to English, Scotch, and American denominations. There are also a Greek chapel and several synagogues.

Notable among the public buildings of Paris are its palaces. The Louvre, a great series of buildings within which are two large courts, is now devoted to a museum; palace of the Tuileries; the palace du Luxembourg; the Palais Royal; the Palais de l'Elysée; the residence of the president of the republic; the Palais du Corps Législatif in which the chamber of deputies meets; and others. The Hôtel de Ville is situated in the Place de l'Hôtel de Ville, formerly Place de Grève, on the right bank of the river. The Hôtel des Invalides is now used as a retreat for disabled soldiers. It contains the burial place of the first Napoleon. The Palais de Justice is an irregular mass of buildings. The Tribunal de Commerce is a quadrangular building enclosing a large court. The mint contains an immense collection of coins and medals. The other principal government buildings are the Treasury and the Record Office. The Exchange is in the form of a parallelogram, 212 ft. by 126 ft., surrounded by a range of sixty-six columns. A distinctive feature are the extensive markets, among the most important of

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which are the Halles Centrales. A notable unique structure is the Eiffel Tower. It is a structure of iron latticework 984 ft. high, and having three stages or platforms. It is the highest building in the world.

The chief institution of higher education is the academy of the Sorbonne. Among others are the secondary schools or lycées, the most important of which are Descartes, St. Louis, Corneille, Charlemagne, Fontanes, De Vanves, the Ecole Polytechnique, Ecole des Beaux Arts, etc. Of the libraries the most important is the Bibliothèque Nationale, the largest in the world. The number of printed volumes which it contains is estimated at 2,500,000, besides 3,000,000 pamphlets, manuscript vols., historical documents, etc. The other libraries are those of the Arsenal, St. Geneviève, Mazarin, De la Ville, De l'Institut, De l'Université (the Sorbonne). Among museums, besides the Louvre and the Luxembourg, there may be noted the Musée d'Artillerie, in the Hôtel des Invalides; the Conservatoire des Arts et Métiers; the Trocadéro Palace; and the Cluny Museum. The chief of the learned societies is the Institute of France. There are many hospitals in Paris, also numerous establishments of a benevolent nature. The theaters of Paris are more numerous than those of any other city in the world. The most important are the Opera House, a gorgeous edifice of great size; the Opéra Comique, the Théâtre Français, the Odéon; the Théâtre de la Gaîté, and Théâtre des Folies Dramatiques. The most important manufactures are articles of jewelry and the precious metals, trinkets of various kinds, fine hardware, paper-hangings, saddlery and other articles in leather, cabinet-work, carriages, various articles of dress, silk and woolen tissues, particularly shawls and carpets, Gobelin tapestry, lace, embroidery, artificial flowers, combs, machines, scientific instruments, types, books, engravings, refined sugar, tobacco, chemical products, etc. That which is distinctively Parisian is the making of all kinds of small ornamental articles, which are called *articles de Paris*. Pop. 2,447,957.

The first appearance of Paris in history is on the occasion of Cæsar's conquest of Gaul, when the small tribe of the Parisii were found inhabiting the banks of the Seine, and occupying the island now called Île de la Cité. It was a fortified town in 360 A.D., when the soldiers of Julian here summoned him to fill the imperial throne. In the beginning of the fifth century it suffered much from the northern hordes, and ultimately fell into the hands of the Franks, headed by Clovis, who made it his capital in 508. In 987 a new dynasty was established in the person of Hugo Capet, from whose reign downward Paris has continued to be the residence of the kings of France. In 1437 and 1438, under Charles VII, Paris was ravaged by pestilence and famine, and such was the desolation that wolves appeared in herds and prowled about the streets. Under Louis XI a course of prosperity again commenced. In the reign of Louis XIV the Paris walls were leveled to the ground after having

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stood for about 300 years, and what are now the principal boulevards were formed on their site (1670). Only the Bastille was left (till 1789), and in place of the four principal gates of the old walls, four triumphal arches were erected, two of which, the Porte St. Denis and Porte St. Martin, still stand. Many of the finest edifices of Paris were destroyed during the Revolution, but the work of embellishment was resumed by the directory, and continued by all subsequent governments. The reign of Napoleon III is especially noteworthy in this respect; during it Paris was opened up by spacious streets and beautified to an extent surpassing all that had hitherto been effected by any of his predecessors. The most recent events in the history of Paris are the siege of the city by the Germans in the war of 1870-71, and the subsequent siege carried on by the French national government in order to wrest the city from the hands of the Commune. Paris has been the scene of international exhibitions in 1855, 1867, 1878, 1889 (in commemoration of the French Revolution), and 1900.

**PARIS EXPOSITION OF 1900.**—The universal exposition in 1900 at Paris opened April 14, and closed November 12. The exposition grounds were located in the center of the city. The two quadrilaterals forming the exposition (the one comprising the art palace, the new bridge and Esplanade of the Invalides, the other the Trocadéro with the series of pavilions stretching to the Salle des Fêtes and Military School) were united by the two banks of the Seine river. On account of the necessary separation by city monuments and streets, large elevated sidewalks connected the several sections, thus making it possible to visit the entire exposition without going outside. The area enclosed was 543.62 acres, including the annex at Vincennes where most of the machinery was exhibited, and where the athletic contests took place.

**Classification.**—In his report, the Commissioner-General said, "Among the difficulties to be overcome, the most formidable is due to the fact, that the different branches of artistic production, agricultural, or industrial, have innumerable points of contact interlacing each other, intermingling almost to the point of confusion; and, in many instances the exhibits are of such a mixed character that a natural hesitation arises as to which category they should really be placed under. They may be appreciated for their intrinsic qualities, or for the uses to which they may be put. A large number change their classification by successive developments. Wool, for example, a product derived from sheep farming, becomes the principal material in the weaving of stuffs for clothing, for curtains and for furniture. Duplication is necessary to overcome this difficulty and the varied classes so closely allied are placed together. We have taken as a basis for classification that of the Exhibition of 1889 and entirely reconstructed it."

The exhibits were classified in eighteen departments as follows: 1. Education and In-



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struction; 2. Works of Art; 3. Instruments and general methods of letters, science and arts; 4. Machinery and processes of mechanism; 5. Electricity; 6. Civil engineering and transportation; 7. Agriculture; 8. Horticulture; 9. Forestry, hunting, fishing, crop-gathering; 10. Alimentation; 11. Mines and metallurgy; 12. Decoration and furniture of public buildings and dwellings; 13. Cotton fabrics, textures and clothing; 14. Chemical industry; 15. Various industries; 16. Social economy, hygiene and public assistance; 17. Colonization; 18. Territorial and naval armies.

**Architecture.**—From an architectural standpoint this exposition was the most artistic the world has ever seen. In every group a retrospective exhibit was arranged to show the growth during the past 100 years. In every department centennial displays were exhibited. The immense reunion of palaces with unheard of richness of statuary, low reliefs, pediments, domes, pillars and columns, shows the different characteristics of the centuries. One of the features was the monumental entrance, which had three arches, each 65 feet wide, arranged triangularly to support a cupola.

Another feature was the bridge, Pont Alexander III. It has but one arch which is 355 feet long and 131 feet wide. The corner stone was laid by the Czar. The bridge is sufficiently high to allow boats to pass, and yet it does not obstruct the view from the avenue. The large art gallery (Grand Palais) fronts on Avenue Nicholas II, which continues from the bridge. The front is Roman in style, the other parts being inspired by the Chateau at Versailles. The structure will be used in the future for annual art exhibitions, etc. More beautiful and in better taste is the little palace (Petit Palais) just across the avenue. It is triangular in form and has 32 Ionic columns in the facade. This will be used as a museum.

**United States.**—The United States was represented officially by Ferdinand W. Peck as Commissioner-General. Seven buildings were erected covering a space of 338,987 square feet. There were more than 7,000 exhibitors and 30,000 exhibits. The U. S. pavilion was erected at a cost of about \$150,000. The interior was a vast hall surrounded by four stories of rooms where an American could be at home with his friends, supplied with papers, books, a postoffice, a bureau of information, a restaurant, etc. There were no exhibits in this building. The United States made a good showing in every department, but perhaps the most conspicuous showing was in the art department. More prizes were awarded in this department than to any other foreign nation.

There were 42,832 awards in all distributed among 75,531 exhibitors. Of course, France received the highest number; the United States was second with 1,981 awards of the following classes: 220 grand prizes; 486 gold medals; 533 silver medals; 422 bronze medals; 270 honorable mentions, and the rest in medals for collaborators. In regard to the success of Americans, United States Commissioner-General

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Peck said: "In number as well as in quality the awards given to the United States exhibitors were superior to those obtained by any other foreign country. The United States in this respect comes next to France herself."

Comparing this exposition with the Paris exposition of 1889—the attendance in 1889 was about 25,000,000. In 1900, 50,470,400 persons entered the grounds. Sixty-five million tickets were issued and all sold at 20 cents each before the exposition opened. These tickets could be purchased only outside the grounds from the hawkers or Credit Lyonnais booths at various prices—as low as 1 cent on the last day. November 7 was a free-day; attendance 438,481. Exhibitors in 1889, 56,612; in 1900, 76,246. Of these France and her colonies had 35,764; foreign nations, 40,479. Weight products in 1889, 30,133 tons; in 1900, 61,352 tons. The power used in running the exposition in 1889 was 9,773 horse power; in 1900 it was 36,200 horse power. The leading foreign nations in 1900 had the following number of exhibits: United States, 7,000; Germany, 3,000; Great Britain, 1,000. There were over 200 American citizens decorated by the French government. The exposition closed November 12.

**Paris**, in Greek mythology, also called Alexander, the second son of Priam, king of Troy, by Hecuba. His mother dreamed before his birth that she had brought forth a firebrand, which was interpreted to mean that he would cause the destruction of Troy. To prevent this the child was exposed on Mount Ida, where he was discovered by a shepherd who brought him up as his own son. Here his grace and courage commended him to the favor of Enone, a nymph of Ida, whom he married. At the marriage of Peleus and Thetis a dispute arose whether Hera, Athena, or Aphrodite was the most beautiful, and as such entitled to the golden apple. Paris was chosen judge, and decided in favor of Aphrodite, who had promised him the fairest woman in the world for his wife. Subsequently he visited Sparta, the residence of Menelaus, who had married Helena (or Helen), the fairest woman of the age, whom he persuaded to elope with him. This led to the siege of Troy, at the capture of which he was killed by an arrow.

**Paris**, LOUIS ALBERT PHILIPPE D'ORLEANS, COMTE DE (1838-94), son of the Duc d'Orleans, and grandson of Louis Philippe. After the revolution of 1848 he resided chiefly in Claremont, England, where he was educated by his mother. During the American Civil War of 1861, he, along with his brother the Duc de Chartres, volunteered into the Northern army and served for some time on the staff of General McClellan. On his return to Europe the following year he married his cousin the Princess Marie-Isabelle, eldest daughter of the Duc de Montpensier. After the Franco-German War he was admitted a member of the first national assembly. Under the expulsion bill (1886) he, along with the other princes, was forbidden to enter France. He published a *History of the Civil War* and a work on *English Trades-unions*.



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**Paris**, Lamar co., Texas, 91 mi. w. of Texarcana. Railroads: St. L. & San F.; Texas & Pacific; Gulf of Colo. & S. Fé. Industries: flouring, saw, and planing mills, canning works, brickyards, foundry and machine shops, cotton gins, etc. Exports include cotton, live stock, grain, and fruits. Pop. 1900, 9,358.

**Park**, MUNGO (1771-1806), African traveler, b. near Selkirk in Scotland. In 1793 he was engaged by the African Society to trace the course of the Niger. He reached the Gambia at the end of 1795, and advancing northeastward arrived at the Niger near Segu. He shortly returned, but in 1805 accepted command of a government expedition to the Niger. He arrived at Boussa, where he was attacked by the natives, and in his efforts to escape was drowned.

**Parker, ALTON BROOKS** (1852- ), an American jurist, educated at the public schools, the Cortland Academy, Cortland Normal School, and the Albany Law School. After being admitted to the bar, he practiced in Kingston, and in 1877 became surrogate of Ulster County. In 1884, he was Delegate to the Democratic National Convention, and in the next year was tendered the office of first assistant postmaster-general. In the same year, he was chairman of the State Executive Committee, and shortly afterward was made a judge of the New York Supreme Court. In 1889, he was appointed a member of the Court of Appeals. In 1904, he was the Democratic nominee for President of the United States.

**Parker, FRANCIS WAYLAND** (1837-1902), an American educator; b. at Bedford, N. H., Oct. 9, 1837; educated in the public schools and an academy. He entered the army as a private in 1861 and served during the Civil War. He was promoted several times and became colonel of the 4th N. H. volunteers. At the breaking out of the war Col. Parker was teaching in Illinois, and on retiring from the army resumed his former vocation. In 1875 he became superintendent of the public schools in Quincy, Mass. His work here soon gained for him a national reputation. In 1880 he took the presidency of the Cook County, Ill., Normal School, retaining the position until 1896. In 1898 he was chosen president of the Chicago Institute. In 1901, when the institute was consolidated with the University of Chicago, and became the School of Education, Col. Parker was retained as the head with the title of director. Col. Parker was opposed to all formalism, and discarded the old routine methods of teaching for what he termed the "Natural Method." He was the author of *Talks on Teaching*, *Quincy Methods*, *How to Teach Geography*, and numerous works on education.

**Parker, THEODORE** (1810-1860), American divine, b. at Lexington, Mass. He studied at Harvard University, and in 1837 was settled as a Unitarian preacher at West Roxbury. Although his doctrine was accounted heterodox, yet such was his eloquence and ability that he soon became famous as a preacher and lecturer in New England. In 1843 he visited England, France, Italy, and Germany, and settled as a

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preacher in Boston on his return. He was a prominent advocate of the abolition of slavery. The principal of his published works are: *Occasional Sermons and Speeches*, and *Sermons on Theism, Atheism, and the Popular Theology*.

**Parkersburg**, Wood co., W. Va., on the Ohio River. Railroads: Baltimore & Ohio; Ohio River, and B. & O. Southern. Industries: chemical works, boiler shops, barrel and furniture factories, lumber and machine shops, and oil refineries. It has a large oil trade. Pop. 1900, 11,703.

**Parkhurst, DR. CHARLES H.**, b. in Massachusetts in 1842. He was graduated from Amherst College at the age of 24, and later he studied theology at Halle and Leipsic. He became pastor of the Congregational Church at Lenox, Mass, in 1874, and in 1880 went to New York City as pastor of the Madison Square Presbyterian Church. He became president of the Society for the Prevention of Crime, and in that capacity made a reputation as a social reformer. Among the books which he has published are, *The Blind Man's Creed* and *Our Fight with Tammany*.

**Parkman, FRANCIS** (1823-1893), historian, was b. in Boston, Mass., graduated at Harvard in 1844, next studied law for two years, then traveled in Europe, and returned to explore the Rocky Mountains. The hardships he endured among the Dakota Indians seriously injured his health, yet in spite of this and defective sight Parkman worked his way to recognition as a historical writer on the period of rise and fall of the French dominion in America. He paid many visits to France to examine archives. His books are *The California and Oregon Trail* (1849), *The Conspiracy of Pontiac* (1851), *Pioneers of France in the New World* (1865), *The Book of Roses* (1866), *Jesuits in North America* (1867), *Discovery of the Great West* (1869), *The Old Régime in Canada* (1874), *Count Frontenac and New France under Louis XIV* (1877), and *Montcalm and Wolfe* (1884).

**Parliament**, the national assembly of the British nation, embracing two branches, the House of Lords and the House of Commons. It has borne this name since the thirteenth century, being the body which succeeded the Great Council of the Realm of the Angevin period, as the latter succeeded the Witenagemote of the Anglo-Saxon times. The English Parliament of to-day properly consists of three states or bodies—the clergy, the lords temporal, and the commons. Originally the clergy sat in the House of Commons (in person or by proxy), as well as in the House of Lords; but in modern times they sit in the latter only, as lords spiritual. Primarily the sovereign was considered a constituent element of Parliament, but the right has in modern times only been exercised by the signing or vetoing of bills (as by the American president), by virtue of being a part of the law-making power. The House of Lords is constituted, besides the clerical portion, of the hereditary peerage, and also of such peers as may be created by the crown. In 1890 there were 551 peers on the roll of the House

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of Lords, of whom twelve were minors. More than one third of these peerages have been created by the crown during the present century.

The House of Lords is prohibited by the constitution of England, like the American Senate, from originating any measures providing for the appropriation of money, the Commons having the exclusive control of all legislation relating to the raising of revenue, even to a greater extent than our House of Representatives. The members of neither of the Houses of Parliament are allowed any compensation of any kind for their services.

The House of Commons consists of 670 members, viz., for England and Wales, 253 representatives of county constituencies (counties or divisions of counties), 237 of boroughs, and 5 of universities; for Scotland, 39 representatives of counties, 31 of burghs, and 2 of universities; for Ireland, 85 representatives of counties, 16 of boroughs, and 2 of a university.

The authority of Parliament extends over the United Kingdom and all its colonies and possessions. The period during which a parliament may sit is seven years, although instances are very rare in English history of a parliament sitting that long. A ministerial crisis generally causes a dissolution and an appeal to the people in the election of a new body. Whenever the minister is defeated in the House of Commons on a measure of vital importance (the House of Lords is not taken into consideration in such an event), the prime minister at once hands in his resignation to the sovereign, and the leader of the opposition is invited to form a cabinet, or "government," as it is termed, and generally the election of a new parliament is ordered.

There existed practically no parliament in England between 1461 and the middle of the reign of Henry VIII. It was the chronic struggle between the Parliament and Stuarts which led to the civil war and the beheading of Charles I. Parliament resumed its old and full power under William III. The Reform acts of 1832, 1867, and 1884, together with the Redistribution act of 1885, have materially modified and improved the statutes relating to the election of members of Parliament.

The Irish Parliament, whose independence was never fully recognized by England, was by the Act of Union of 1801 dissolved, and in consideration thereof it was provided that 28 Irish peers (elected for life) should sit in the House of Lords, and that 100 Irish members should be elected to the House of Commons.

Successive measures of reform, notably those of 1867 and 1884, have extended the franchise for voting for member of Parliament, until now all householders and £10 lodgers have that privilege. The colonies and dependencies of Great Britain have no direct representation in Parliament although colonial affairs occupy a large portion of its time and attention, and at times their agitation has caused changes of administration. The sessions of Parliament are held annually, usually from about the middle of February to the end of August, and are

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customarily closed by prorogation on the part of the crown.

**Parma**, a city of North Italy, capital of the province of Parma, on the small River Parma, 72 mi. s.e. of Milan. The principal squares are four, and one of them, the Piazza Grande, is large and handsome. Among the more important buildings are the cathedral, the baptistery, the church of La Steccata, the church of San Giovanni, and many others. Parma was originally an Etruscan town, and became a Roman colony in 183 B.C. The manufactures are of silk, cottons, woollens, felt hats, etc. Pop. 44,494. The province lies on the right bank of the Po; area 1,253 sq. mi.; pop. 277,842. It is watered chiefly by the Taro, the Parma, and the Enza, all of which fall into the Po.

**Parma, DUCHY OF**, formerly an independent state of Upper Italy, but since 1860 incorporated in the kingdom of Italy, and divided into the provinces of Parma and Piacenza. It comprehended the three duchies of Parma proper, Piacentia or Piacenza, and Guastalla, and had an area of about 2,266 sq. mi. Parma anciently formed part of Gallia Cispadana and Liguria. Charlemagne made a present of it to the pope; but it subsequently became an independent republic, and in the sixteenth century was erected into a duchy which was long ruled by the Farnese dukes. The victories of the French in Italy in the beginning of this century enabled Napoleon to seize the duchy and attach it to his kingdom of Italy. After Napoleon's downfall it fell to his widow, the Archduchess Maria Louisa, for life, and thereafter to the Duke of Lucca.

**Parnas'sus** (or Liaku'ra), a mountain of Greece, situated in Phocis, 65 mi. n.w. of Athens. It has two prominent peaks, one of which was dedicated to the worship of Bacchus, and the other to Apollo and the Muses, while on its southern slope was situated Delphi and the Castalian fount. Its height is 8,068 ft., and a magnificent view is obtained from its top.

**Parnell, CHARLES STEWART** (1846-1891), b. at his father's estate of Avondale, county Wicklow, Ireland. He was educated at Magdalen College, Cambridge; became member of Parliament for Meath in 1875; organized the "active" Home Rule party, and developed its obstruction tactics; and in 1879 formally adopted the policy of the newly-formed Land League, was an active member of it, and was chosen president of the organization. In 1880 he was returned for the city of Cork, and was chosen as leader of the Irish party. In the session of 1881 he opposed the Crimes act and the Land act; was arrested under the terms of the former, along with other members of his party; and was lodged in Kilmainham Jail, from whence he was not released until the following May. In 1883 he was the recipient of a large money testimonial (chiefly collected in this country), and in this year was active in organizing the newly-formed National League. At the general election of 1885 he was re-elected for Cork, and next year he and his

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followers supported the Home Rule proposals introduced by Mr. Gladstone, while he also brought in a bill for the relief of Irish tenants that was rejected. In 1887 he and other members of his party were accused by the *Times* newspaper of complicity with the crimes and outrages committed by the extreme section of the Irish Nationalist party. To investigate this charge a commission of three judges was appointed by the government in 1888, with the result that, after a great deal of evidence was heard on both sides, a report was laid before Parliament in February, 1890, Mr. Parnell being acquitted of all the graver charges.

**Par'ody**, a kind of literary composition, usually in verse, in which the form and expression of grave or serious writings are closely imitated, but adapted to a ridiculous subject or a humorous method of treatment.

**Parole'**, a promise given by a prisoner of war that he will not try to escape if allowed to go about at liberty; or to return, if released, to custody at a certain time if not discharged, or not to bear arms against his captors for a certain period, and the like.

**Pa'ros**, an island in the Grecian Archipelago, one of the Cyclades, 4 mi. w. of Naxos; length 13 mi.; breadth 10 mi. It is generally mountainous; but the soil, though often rocky, is fertile, and in some places well cultivated. Its marble has been famous from ancient times, and is the material of which some of the most celebrated pieces of statuary are composed. Paros was the birthplace of the poet Archilochus and the painter Polygnotus. Parikia, a seaport on the northwest coast, is the chief village; pop. 2,200. Pop. of island 6,885.

**Parrot**, a name common to birds of the family Psittacidae, of the order Scansores or climbers. The bill is hooked and rounded on all sides, and is much used in climbing. The tarsi are generally short and strong, the toes being arranged two forward and two backward. The tongue, unlike that of most other birds, is soft and fleshy throughout its whole extent. The wings are of moderate size, but



The Gray Parrot.

the tail is often elongated, and in some cases assists in climbing. The plumage is generally brilliant. Parrots breed in hollow trees, and subsist on fruits and seeds, several species can not only imitate the various tones of the human voice, but also exercise in some cases actual conversational powers. Some live to a great age, instances being known of these birds reaching seventy and even ninety years. The species are numerous, and are known under the various names of parrots, parakeets, macaws, lorikeets, lories, and cockatoos, the name parrot, when used distinctively, being generally ap-

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plied to species of some size, that have a strongly hooked upper mandible and a tail short or of medium length. They are natives of both tropical and sub-tropical regions. The best known species is the Gray Parrot of Western Africa, which can be most easily trained to talk. The Green Parrots are also common as domestic pets, being brought from the tropical regions of South America. The Carolina parrot is found in the U.S., and is gregarious in its habits.

**Parry**, SIR WILLIAM EDWARD (1790-1855), b. at Bath. He joined the navy in 1803, became lieutenant in 1810, took part in the successful expedition up the Connecticut River in 1813, and continued on the North American station till 1817. In the following year he was appointed commander of the *Alexander* in an expedition to the Arctic regions under Sir John Ross, and during the succeeding nine years he commanded various expeditions on his own account in efforts to find a northwest passage, and to reach the north pole. He afterward filled various government situations, became rear admiral of the white, lieutenant governor of Greenwich Hospital, and received the honor of knighthood.

**Parsees'**, the name given in India to the fire-worshipping followers of Zoroaster, chiefly settled in Bombay, Surat, etc., where they are among the most successful merchants. They have a great reverence for fire in all its forms, since they find in it the symbol of the good deity Ahurâ-Mazda (Ormuzd). To this divinity they have dedicated "fire temples," on whose altar the sacred flame is kept continually burning. Benevolence is the chief practical precept of their religion, and their practise of this finds its evidence in their many charitable institutions. One of the most curious of their customs is in the disposal of their dead. For this they erect what are called "towers of silence," built of stone, about 25 ft. high, and with a small door to admit the corpse. Inside is a large pit with a raised circular platform round it on which the body is exposed that it may be denuded of flesh by vultures, after which the bones drop through an iron grating into the pit below. The number of Parsees in India at last census was 72,065.

**Parsley**, a plant of the nat. order Umbelliferae, one species of which, the common parsley, is a well-known garden vegetable, used for communicating an aromatic and agreeable flavor to soups and other dishes. It is a native of Sardinia.

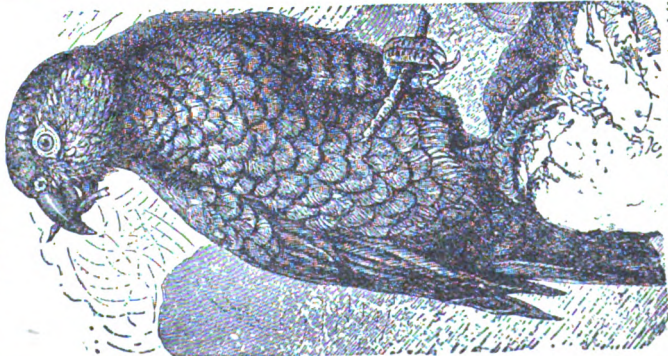
**Parsnip**, a plant of which there are many varieties. It is tall, erect, with pinnate leaves and bright yellow flowers, common throughout England and in most parts of Europe and America, and much cultivated for its roots, which have been used as an esculent from a very early period.

**Parsons**, Labette co., Kan., on Big Labette River, 138 mi. s. of Kansas City. Railroads: M. K. & T. (six divisions); K. C. F. S. M. Industries: railroad shops, two flouring mills, iron foundry, coal miners' tools, drills, and handle factories. Surrounding country agri-





4. Rose-colored Parrot of Brazil and Mexico (*Psittacula roseicollis*).



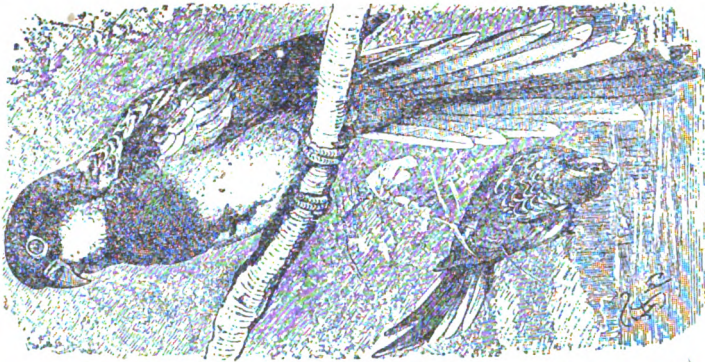
2. Parrot of N. Zealand (*Nestor notabilis*).



3. Arara, Australian Parrot (*Sittace militaris*).



4. Parrot of Alexandria (*Palaeornis alexandri*).



Common flat-tailed Australian Parrot (*Platyercus eximius*).

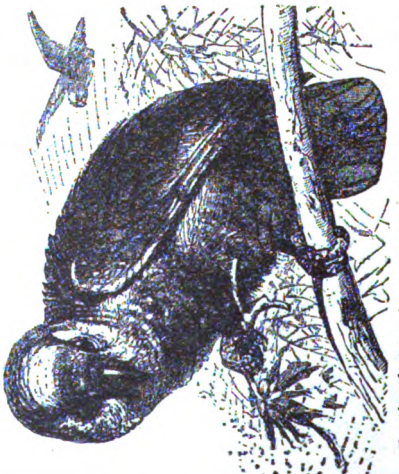




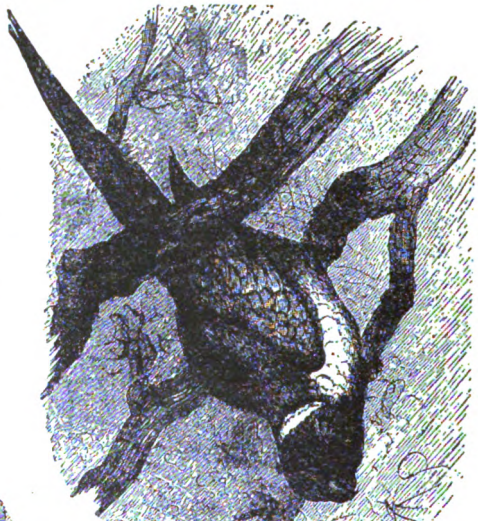
1. White Parrot (*Ptilinopus leadbeateri*).



2. Gray Parrot (*Psittacus erythacus*).



3. South American Parrot (*Chrysotis amoena*).



6. Parrot with wedge-shaped tail (*Trichoglossus novae-hollandiae*).



Small Parrot of Australia (*Melopsittacus undulatus*).



4. Little Grass Parrot of Australia (*Euphonia pulchella*).



7. Parrot of the Carolinas (*Conurus carolinensis*).



## Parthenogenesis

cultural. The town was first settled in 1871, and became a city in 1873. Population, 1900, 7,682.

**Parthenogenesis**, in zoology, a term applied to the production of new individuals from virgin females by means of ova, which are enabled to develop themselves without the contact of the male element. We find several examples of this peculiar phenomenon among insects. The most notable are the aphides or plant lice, whose fertilized ova, deposited in the autumn, lie without apparent development throughout the winter, and in the following spring produce modified females only. These females, without sexual contact with the males, give birth to a second generation like to themselves, and this form of reproduction is indefinitely repeated. In the succeeding autumn, however, male insects appear in the brood, and the ova are again impregnated with the male element. In this case parthenogenesis has more the appearance of alternate generation. Perhaps the truest instance of parthenogenesis is found in the unfertilized queen bee, which deposits eggs out of which male or drone bees are hatched. The eggs which produce neuters or females are impregnated in the usual way, but the eggs which produce the males are not fertilized. In the silkworm moth certain females, without fertilization, produce eggs from which ordinary larvæ are duly developed.

**Par'thenon**, a celebrated Grecian temple of Athena, on the Acropolis of Athens, one of the finest monuments of ancient architecture. It is built of marble, in the Doric style, and had originally 8 columns on each of the two fronts, with 17 columns on the sides, or 46 in all, of which 32 are still standing; length 228 ft., breadth 101, and height to the apex of the pediments 64 ft.; height of columns 34 ft. 3 in. The pediments were filled with large statues, the metopes adorned with sculptures in relief. After serving as a Christian church and as a mosque, it was rendered useless for any such purpose in 1687 by the explosion of a quantity of gunpowder which the Turks had placed in it during the siege of Athens by the Venetians. Though the more precious pieces of sculpture have been dispersed among various European collections, the Parthenon still bears an imposing aspect.

**Parthia**, in the widest sense, was the Parthian Empire, lying between the Euphrates, the Oxus, the Caspian Sea, and the Arabian Sea. In the narrowest sense Parthia was the small country formerly inhabited by the Parthians, and situated in the northwestern part of the modern Persian province of Khorasan. The Parthians were of Scythian origin, fought only on horseback, and were celebrated for their skill in archery. They were subject successively to Persians, Macedonians, and Syrians, and they resisted the Romans with various fortune.

**Partick**, a police burgh, Scotland, county of Lanark, on the Kelvin and the Clyde, adjoining Glasgow on the west. It has flour mills, engineering works, shipbuilding yards, etc. It

## Partridge

gives name to a parliamentary division of Lanarkshire. Pop. 1891, 36,538.

**Partnership** is the association of two or more persons for the purpose of undertaking and prosecuting conjointly any business, occupation, or calling; or a voluntary contract by words or writing, between two or more persons, for joining together their money, goods, labor, skill, or all or any of them, upon an agreement that the gain or loss shall be divided in certain proportions among them, depending upon the amount of money, capital, stock, etc., furnished by each partner. Partnership may be constituted by certain acts connected with the undertaking apart from any deed or oral contract. The duration of the partnership may be limited by the contract or agreement, or it may be left indefinite, subject to be dissolved by mutual consent. The members of a partnership are called *nominal* when they have not any actual interest in the trade or business, or its profits; but, by allowing their names to be used, hold themselves out to the world as apparently having an interest; *dormant* or *sleeping*, when they are merely passive in the firm, in contradistinction to those who are active and conduct the business as principals, and who are known as *ostensible* partners. A partnership may be limited to a particular transaction or branch of business, without comprehending all the adventures in which any one partner may embark, but such reservation must be specified in the deed of contract. For in the usual course each member of a partnership is liable at common law for the debts of the firm, and a sleeping partner is responsible for all debts of the firm which have been contracted during his partnership. The powers of partners are very extensive, and the contract or other act of any member or members of the associated body in matters relating to the joint concern, is, in point of law, the contract or act of the whole, and consequently binding upon the whole, to the extent of rendering each liable for it individually as well as in respect of the partnership property. This power does not extend to matters extraneous to the joint concern. Partners, though they should act in a fraudulent manner as respects their copartners, bind the firm in all matters connected with its peculiar dealings.

**Partridge**, a well-known rasorial bird of the Grouse family. The common partridge is the most plentiful of all game birds in Britain, and occurs in nearly all parts of Europe, in North Africa, and in some parts of Western Asia. The wings and tail are short, the tarsi as well as the toes naked, and the tarsi not spurred. The greater part of the plumage is ash-gray finely varied with brown and black. They feed on grain and other seeds, insects, and their larvæ and pupæ, and are chiefly found in cultivated grounds. Besides this species there are the red-legged, French, or Guernsey partridge, which may now be found in considerable numbers in different parts of England; the Greek partridge, the African partridge, the Arabian partridge, the Indian partridge. The name partridge is applied in



## Partridge Berry



a.—Common Partridge; b.—Red-Legged Partridge.

this country to several species of the genus *Ortyx* or quails.

**Partridge Berry**, a plant of the heath family, inhabiting North America, also known as wintergreen. The name is also applied to another North American shrub, a pretty little trailing plant with white fragrant flowers and scarlet berries, nat. order Rubiaceæ.

**Parts of Speech** are the classes into which words are divided in virtue of the special functions which they discharge in the sentence. Properly speaking there are only seven such classes, namely, the noun, adjective, pronoun, verb, adverb, preposition, and conjunction; for the article, which is usually classed as a separate part of speech, is essentially an adjective, while the interjection can hardly be said to belong to articulate speech at all.

**Pasadena**, Los Angeles co., Cal., east side of Arroyo Seco River, 10 mi. n.e. of Los Angeles. Surrounding country mostly fruit raising, principal products being lemons, oranges, apricots, peaches, prunes, etc. Railroads: Southern Pacific; Santa Fé; L. A. Terminal; and L. A. & P. Electric. Industries: sash, door, and mill work. The place was first settled in 1873, and became a city in 1896. Pop. 1900, 9,117.

**Pascal**, BLAISE (1623–1662), a French philosopher and mathematician, b. at Clermont, in Auvergne. In 1647 he invented a calculating machine, and about the same time he made several discoveries concerning the equilibrium of fluids, the weight of the atmosphere, etc. He came under the influence of the Jansenists, Arnauld, and others, and from 1654 he lived much at the monastery of Port Royal, and partly accepted its rigorous rule, though he never actually became a solitaire. He afterward retired to a country estate, and finally returned to Paris, where he closed a life of almost unbroken ill-health.

**Pas-de-Calais** (pä-dé-kä-lä), a maritime department of Northern France; area 2,550 sq. mi. Its coast, extending about 80 mi., presents a long tract of low sand hills, but near Boulogna forms a lofty, crumbling cliff. The interior is generally flat, the streams and canals are numerous, and the soil fertile and well cultivated. The principal harbors are Boulogna and Calais. The chief minerals are indifferent coal, good pipe and potter's clay,

## Passengers

and excellent sandstone. There are numerous iron foundries, glass works, potteries, tanneries, bleach works, mills, and factories of all kinds. The capital is Arras. Pop. 874,364.

**Pasha**, in Turkey, an honorary title originally bestowed on princes of the blood, but now conferred upon military commanders of high rank and the governors of provinces. There are three grades, each distinguished by a number of horse tails waving from a lance, the distinctive badge of a pasha. Three horse tails are allotted to the highest dignitaries; the pashas of two tails are generally the governors of the more important provinces; and the lowest rank, of one tail, is filled by minor provincial governors.

**Passaic**, Passaic co., N. J., on Passaic River, 12 mi. w. of New York. Railroads: Erie; Susquehanna; D. L. & W. Industries: worsted mill, iron foundry, five woolen mills, cotton mill, and about fifteen other factories. The town was first settled in 1684 and became a city in 1873. Pop. 1900, 27,777.

**Passamaquoddy Bay**, a bay opening out of the Bay of Fundy, and lying between the state of Maine and New Brunswick. It is about 13 mi. long and 6 mi. wide, and is dotted with islands which make a safe harbor for the thriving town of Eastport.

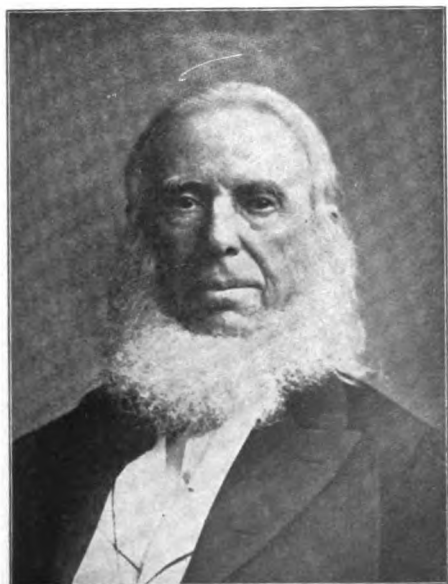
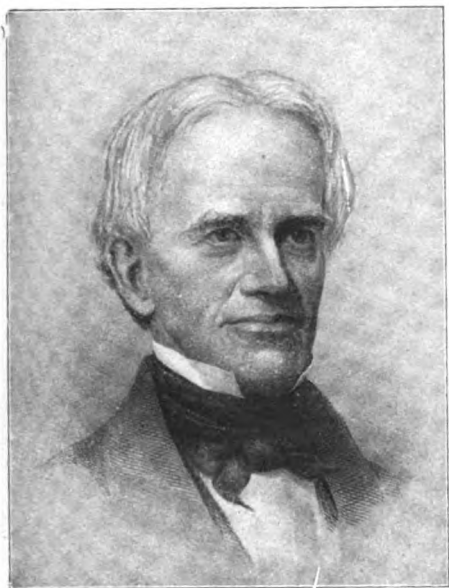
**Passenger Pigeon**, a bird of the Pigeon family,

which abounds in America. It is distinguished from the common pigeon chiefly by its long graduated tail. It is about 15 in. in length, with finely tinted plumage, small head, and long wings. The multiplication of these pigeons is so rapid, and their destructive power so great, that they are obliged to migrate from place to place in vast flocks to obtain their food. They fly in dense columns at a great height, and such a column, one mile broad and one hundred and forty miles long, has been observed. The larger breeding places are said to cover a forest area of about forty miles.



Passenger Pigeon.

**Passengers**.—In law the railway and other public carriers contract to carry passengers without any negligence on their (the carriers') part. In case of accident it lies on the carrier to show that it was from no fault or negligence on his part, or on the part of his servants, that the accident occurred. Hence all passengers injured (or in case of death their nearest relatives) have a claim for compensation, unless it



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**Thomas Arnold  
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## Passion Flower

can be proved that the accident was due to the fault of the passenger. Passengers by sea are carried subject to the same general law as those by land; the carriers are bound to observe all due precautions to prevent accident or delay. No passenger ship having fifty persons on board, and the computed voyage exceeding eighty days by sailing vessels or forty-five by steamers, can proceed on its voyage without a duly qualified medical practitioner on board.



Passion Flower.

In the case of imminent danger from tempest or enemies passengers may be called upon by the master or commander of the ship to lend their assistance for the general safety.

**Passion Flower**, a large genus of twining plants belonging to the natural order *Passifloraceæ*. They are all twining plants, often scrambling over trees to a considerable length, and in many cases are most beautiful objects,

on account of their large, rich, or gaily-colored flowers, which are often succeeded by orange-colored edible fruits, for which indeed they are chiefly valued in the countries where they grow wild. See colored plate, Flowers.

**Passion Plays** (Miracle Plays or Mysteries), fantastic dramas founded on the historical incidents of the Old and New Testaments, and also on legends of the lives of saints. These were presented first in churches, and subsequently in the open fields or streets. The first we read of the performance of these plays was in the fourth century, supposedly introduced by Gregory Nazianzen; again, about 920. Hroswitha, a nun of Gandersheim, in Saxony, wrote six Latin plays on the *Lives of Saints*; then in 1110, 1183, and 1264 appeared miracle plays under the patronage of high dignitaries of the church. During the fifteenth and succeeding centuries they were immensely popular in England, Germany, and France. But in the later centuries there was mingled buffoonery with their representations to an extent which made them to a large degree scandalous. But there was one exception to the degeneration which characterized the presentation of the passion plays. In 1633, the inhabitants of a small village called Oberammergau, in the Bavarian highlands, made a vow in gratitude for the cessation of a plague which had desolated the adjacent vicinity, that they would perform every tenth year the *Passion of our Saviour*, a vow which has since been regularly and conscientiously observed. In 1870, 1880,

## Pasteur

and 1890 the play was given with great solemnity and effect. The leading wood carver of the village, a peasant of pure life and serene aspect, on those occasions personated the Saviour, and the effect was very impressive, all the other parts being appropriately represented without any approach to irreverence. But with the exception of this decennial rendition of the passion play at Oberammergau, its production may be said to be dying out in Europe, it being offensive to the general sense of propriety and reverence. Its proposed presentation in New York City a few years ago, was interdicted by the authorities, and no other effort has since been made to introduce it into this country.

**Pas'sover**, a feast of the Jews, instituted to commemorate the providential escape of the Hebrews in Egypt, when God, smiting the first-born of the Egyptians, *passed over* the houses of the Israelites, which were marked with the blood of the paschal lamb. It was celebrated on the first full moon of the spring, from the 14th to the 21st of the month Nisan, which was the first month of the sacred year. During the eight days of the feast the Israelites were permitted to eat only unleavened bread, hence the Passover was also called the "feast of unleavened bread." Every householder with his family ate on the first evening a lamb killed by the priest, which was served up without breaking the bones. The passover was the principal Jewish festival.

**Passport**, a warrant of protection and authority to travel, granted to persons moving from place to place, by a competent authority. In some states no foreigner is allowed to travel without a passport from his government, and in all cases the visitor to the continent of Europe is wiser to provide himself with one, if only as a means of identification. In Russia and Turkey in particular, a passport is indispensable. In the U. S. passports, with description of the applicant, are issued by the State Department at Washington. They are good for two years from date, renewable by stating the date and number of the old one. The fee required is one dollar. They are issued only to citizens, native-born and naturalized.

**Pasteur** (pâs-teur), LOUIS (1822-1895), French chemist and physicist, b. at Dole, Jura, educated at Jena University, and the Ecole Normale, Paris, where in 1847 he took his degree as doctor. The following year he was appointed professor of physics in Strasburg, where he devoted much research to the subject of fermentation; in 1857 he received the appointment of dean in the Faculty of Sciences, Lille; in 1863 he became professor of geology, chemistry, and physics at the Ecole des Beaux-Arts, Paris; and in 1867 professor of chemistry at the Sorbonne. He became a member of the French Academy in 1882. He was especially successful in proving the part played by microbes in fermentation and decomposition, in introducing a successful treatment of disease in silkworms and cattle, and has achieved great success in his efforts to

## Pasteur

check hydrophobia by means of inoculation. Since 1886 the center of his work has been at the Pasteur Institute in Paris. His work was at first chemical. Following up well known researches by Arago, Biot, and Mitscherlich, Pasteur discovered the facets on tartrate crystals and what are called left-handed tartrates. He also propounded the theory that "molecular dissymmetry"—supposed to be expressed in the power which solutions of some organic substances have of causing a beam of polarized light to rotate—was characteristic of living matter and its products.

It is said that a German manufacturer of chemicals noticed that impure tartrate of lime fermented when dissolved and exposed in the sun, and that this prompted Pasteur to an investigation, the result of which was the discovery of a living ferment—a micro-organism comparable in its powers to the yeast-plant which Cagniard-Latour and Schwann had discovered in alcoholic fermentation. Pasteur was further able to show that the little organism would, in a solution of paratartrate of ammonia, select for food the "right-handed" tartrates alone, leaving the "left-handed," although the difference between these is merely physical not chemical. Having got hold of a clue, Pasteur went on to show that other fermentations—lactic, butyric, acetic—are essentially due to organisms. He was naturally led to corroborate and extend Schwann's researches on putrefaction, which is also due to micro-organisms, and this path of investigation enabled him to make important practical suggestions in regard to the making of vinegar and the prevention of wine disease, as also to correct insufficiently careful experiments which were leading many to believe that spontaneous generation was demonstrable.

Prompted by his illustrious master Dumas, Pasteur next (1865) directed his inquiries to those diseases of silkworms by which the silk industry in France had been almost ruined. It is said that he had never before even seen a silkworm, though he knew the supposed disease germs which had been demonstrated by previous investigations in the insect's blood. These he traced from egg to larva, from chrysalis to moth; and, as the pébrine disease is distinctly manifest in the adults, though it may be hidden in the young, the practical conclusion was plain that unhealthy moths should be rejected, and that all precautions should be taken to prevent infection. But Pasteur's work on the diseases of silkworms overstrained him, and in 1868 he was laid aside by paralysis. Soon, however, he was at work again, investigating beer, as he had investigated wine, detecting the intruders which sometimes interfere with the life of the yeast plant and spoil the brew. His researches began to come yet closer to human life, for he attacked the problem of splenic fever, the bacillus of which had been discovered by Davaine (1863), and skillfully traced from stage to stage by Koch (1876). Of Pasteur's investigations in this connection, that by which he showed that birds were not liable to fall victims to splenic fever, because

## Patagonia

the temperature of their blood is too high for the prosperity of the germ, may serve as a characteristic illustration. Passing from splenic fever to fowl cholera, Pasteur showed that it was possible to attenuate the virulence of injurious micro-organisms by exposure to air, by variety of culture, or by transmission through various animals. He thus "tamed" the bacillus of splenic fever, and demonstrated that sheep and cows "vaccinated" with the attenuated bacilli were protected from the evil results of a subsequent inoculation with the virulent virus. Pl. 17, Vol. II.

**Pastor**, a genus of birds belonging to the starling family, found in the north of Africa,



Pastor.

Syria, and India. The rose-colored pastor (*P. roseus*) is a favorite song bird.

**Pastoral Poetry**, poetry which deals, in a more or less direct form, with rustic life. It has generally flourished in highly corrupted artificial states of society. Thus it was that Theocritus, the first pastoral poet, made artistic protest against the licentiousness of Syracuse, and Vergil wrote his *Bucolics* and *Eclogues* in the corrupt Roman court. In the sixteenth century pastoral poetry received its most notable expression in the *Arcadia* of G. Sannazaro, the *Aminta* of Tasso, and the *Pastor Fido* of Guarini. This tendency, which was so potent in Italy, spread to England, and influenced the *Shepherd's Calendar* of Spenser, the *Arcadia* of Sidney, the *Faithful Shepherdess* of Fletcher, *As You Like It* of Shakespeare, and the *Comus* of Milton. The *Gentle Shepherd* of Allan Ramsay (1725) was the last successful dramatic pastoral.

**Patago'nia** is the name applied to that extreme portion of South America which is bounded e. by the Atlantic, w. by the Pacific, s. by the Strait of Magellan, and n. by the Rio Negro. Since 1881 this large territory has been, by treaty, divided between Chile and the Argentine Republic, so that the portion west of the Andes (63,000 sq. mi.) belongs now to the former, and the portion east of the Andes (360,000) belongs to the latter. The Straits of Magellan form a southern boundary of 360 mi., and separate the mainland from the innumerable islands of Terra del Fuego. Here the Chilean government has established the settlement of Punta Arenas, with stations along the coast. Patagonia east of the Andes

## Patchouli

consists mainly of vast undulating plains, frequently covered with shingle and broken up by ridges of volcanic rock. The vegetation is scanty, except in the region adjoining the Andes, and in many places there are shallow salt lakes and lagoons. The chief rivers are the Rio Negro, the Chupat, the Rio Desire, and the Rio Chico, all of which have their sources in the Andes, and run eastward. There are few if any good seaports. The Patagonians are a tall, muscular race averaging fully 6 ft. in height, with black hair, thick lips, and skin of a dark brown color. They are a nomad race, divided into numerous tribes, whose chief occupation is in hunting and cattle breeding. This native population, however, never numerous, is rapidly disappearing. Colonization is encouraged by the Argentine government, and there are many tracts suitable for European settlement. The country was first discovered by Magellan in 1520.

**Patchouli**, a perfume obtained from the dried leaves and branches of the *Pogostemon patchouli*, a labiate plant of India and China, where it is cultivated on a large scale. It is used in India to scent costly Cashmere shawls, tobacco, and hair oil, and is everywhere valued as a preservative of woollens and linens from insects.

**Patent**, a privilege from government granted by letters patent, conveying to the individual or individuals specified therein the sole right to make, use, or dispose of some new invention or discovery for a certain limited period. Before the Declaration of Independence patents were occasionally issued by the colonial governments; and the constitution of the U. S. expressly vested in Congress powers "to promote the progress of science and the useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." The Congress of 1790 passed an act regulating the issue of patents for inventions, requiring the would-be patentee to petition the secretary of state, the secretary of war, or the attorney general; with the approval of any two of these the description of the patent was certified by the attorney general, and the president directed the issuing of the patent. The patent was recorded in the office of the secretary of state, and delivered to the patentee under the great seal of the U. S. Under this law, which remained practically unchanged till 1836, patents were granted with little examination, and the responsibility of deciding whether the patentee had made out his case was left wholly to the courts—a system found to be inconvenient and unsatisfactory for the interests of the public. On occasion of a fire at the Patent Office, when many of the documents were destroyed, Congress repealed former acts and established a new system, which remains in force till now. Patents are granted for a period of seventeen years. The Patent Office is attached to the department of the secretary of the interior. The commissioner, assistant commissioner, and three examiners-in-chief are appointed by the president, with the consent of

## Patmos

the Senate. The chief clerk, a staff of a hundred examiners (principal, first assistants, second assistants, third assistants), draughtsmen, copyists, attendants, etc., are nominated by the commissioner of patents and approved by the secretary of the interior. The office publishes pamphlets on *The Patent Laws and Laws relating to the Registration of Trade-marks and Labels*, and *The Rules of Practice in the U. S. Patent Office*, which may be had on application. The number of patents issued in the U. S. greatly exceeds that of any other country. In 1837-46 the number was 5,019; in 1847-56 it was 12,578; in the decade 1877-86 it was 169,478; in the century ending April 10, 1890, nearly 437,000 grants were made.

**Paterson**, Passaic co., N. J., on Passaic River, 20 mi. n.w. of New York. Railroads: Erie; D. L. & W.; N. Y. S. & W. Industries: over a hundred silk mills, woolen, rolling, and flour mills, flax, jute, linen thread, shirt, silk accessories, velvet, tapestry, twilling, braid, and engine factories. Until 1865 was the center of the American cotton industry; now the largest silk center of the world. The town was first settled in 1792 and became a city in 1851. Pop. 1900, 105,171.

**Paterson**, WILLIAM (1665-1719), financier and founder of the Bank of England, was b. in Dumfriesshire. He went through England as a peddler, settled for a time at Bristol, subsequently resided in the Bahama Islands. Returning to London he engaged in trade with success, and in 1694 proposed and founded the Bank of England, being one of its first directors. Before this time he had conceived the project of founding a free emporium of trade in Darien, and in 1695 he obtained the sanction of a Scottish act of Parliament constituting the Darien Company. After the failure of this great scheme he returned to England, broken in health and fortune. When the Treaty of Union between England and Scotland was concluded in 1707, Paterson, who was one of its warmest advocates, after much difficulty received an indemnity of \$90,000 for the losses he had sustained.

**Patia'la**, an Indian native state in the jurisdiction of the Punjab government, the larger part of which is situated south of the Sutlej and the other part in the hill country near Simla; area 5,887 sq. mi. Besides the usual agricultural products, the state has slate, lead, marble, and copper mines. The Mahārāja of Patiala has been of service to the British government on several critical occasions, such as the mutiny of 1857, and for this loyalty he has been rewarded by an increase of territory. Pop. of the state, 1,467,433. The capital is Patiala; 130 mi. s.e. of Amritsir. It was founded in 1752 by Sardar Ala Singh, and has a pop. of 53,629.

**Patmos**, an island of Turkey in Asia, in the Grecian Archipelago, about 26 mi. s.s.w. of Samos; greatest length, 12 mi.; breadth, nearly 6. The island is an irregular mass of barren rock, agricultural products are scanty, and the population find their chief occupation in fishing. Near the excellent natural harbor of La



## Patna

Scala is the small town Patmos, overlooked by the old monastery of St. John, in a grotto of which, it is said, the apostle John saw his apocalyptic visions. Pop. about 4,000.

**Patna**, a city of Hindustan, in the lieutenant-governorship of Bengal, situated on the Ganges near its junction with the Son and the Gandak, and about 400 mi. n.w. from Calcutta. It extends for nine miles along the river, from which its tombs, mosques, and monuments present a fine appearance. On the west side is the suburb of Bankipur, where the government offices and European residences are situated. By reason of its central position and natural advantages the city is an important business center, and the chief seat of the opium trade. Pop. 170,654. The district of Patna has an area of 2,079 sq. mi., for the most part flat and exceedingly fertile. The staple crop is rice, and other products are wheat, barley, cotton, tobacco, and sugar corn. Pop. 1,756,856.

**Paton**, SIR JOSEPH NOEL, a historical painter, was b. at Dunfermline in 1821. He studied for some time at the Royal Academy; attracted attention by his outline etchings illustrative of Shakespeare and Shelley; exhibited his first picture of *Ruth Gleaning* at Edinburgh in 1844; gained one of three premiums at Westminster competition by his fresco of the *Spirit of Religion*, and a prize of \$1,500 by his paintings, *Christ Bearing the Cross* and *The Reconciliation of Oberon and Titania*. During subsequent years he has produced many pictures, well known by engravings, such as *The Pursuit of Pleasure*, *Home—a soldier's return from the Crimea*, *In Memoriam—a scene from the relief of Lucknow*, *Mors Janua Vitae*, *Faith and Reason*, *Lux in Tenebris*, *The Man with the Muck Rake*, etc. He has also published two volumes of verse.

**Patriarchs** are the antediluvian heads of families, and the three fathers of the Hebrew race, Abraham, Isaac, and Jacob. The term at a later period became the title of the presidents of the sanhedrim, which exercised a general authority over the Jews of Syria and Persia after the destruction of Jerusalem. From them the title was adopted by the Christians, who applied it, from the beginning of the fifth century, to the bishops of Rome, Constantinople, Alexandria, Antioch, and Jerusalem. The patriarch of Rome became the supreme pontiff of the West, the four heads of the Eastern Church preserving the title of patriarch. The patriarch of Constantinople is the primate of the Greek Church in the Ottoman Empire, and bears the title of *oecumenical*.

**Patrick** (Patricius), St. (396-469), the apostle of Ireland, was b. in the British Roman province of Valentia, probably at Nemthur on the Clyde where Dumbarton now is. Having been ordained a bishop and received the papal benediction from Celestine I, he went over to Ireland about the year 432. Here he is said to have founded over 300 churches, baptized with his own hand more than 12,000 persons, and ordained a great number of priests.

## Paul

**Patrick**, ST., ORDER OF, an Irish order of knighthood, instituted in 1783 by George III. originally consisting of the sovereign, the lord lieutenant of Ireland for the time being, and fifteen knights; but by a statute in 1833 the order was enlarged and the number of knights raised to twenty-two. The badge of the order is of gold, oval in shape, with the cross of St. Patrick surmounted by a shamrock in the center, and round this is a blue, enameled band bearing the motto, "Quis separabit." The badge is suspended to a collar of roses and harps by means of an imperial crown and gold harp. The mantle and hood are of sky-blue tabinet, lined with white silk.

**Patron**, in the Roman Republic, a patrician who had plebeians, called *clients*, under his immediate protection, and whose interests he supported by his authority and influence. In later times the term patron was applied to every protector or influential promoter of the interests of others; hence the saints who were believed to watch over the interests of particular persons, places, or trades were called *patron saints*.

**Patti**, ADELINA MARIA CLORINDA, opera singer, was b. at Madrid in 1843; received her musical training from her brother-in-law, Maurice Strakosch; made her first appearance in New York in 1859 as Lucia; and in 1861 made a brilliant debut at Covent Garden, London, in the parts of Amina, Violetta, Zerlina, and Martha. After this she was acknowledged the greatest artist of her day. She visited the chief cities of America, where she gained a wide reputation. She was as popular in continental Europe as in America and England. In 1868 she married the Marquis de Caux, from whom in 1883 she obtained a divorce. On the death of her second husband, Signo Nicolini, a celebrated tenor, she married Baron Cederstrom, a Swedish nobleman. Her work now is mainly on the concert stage. She resides in a beautiful castle in South Wales.

**Pau** (pó) a town of France, capital of the department of Basses-Pyrenees, formerly of Béarn, picturesquely situated on a height above the right bank of the Gave-de-Pau, in view of the Pyrenees (10 mi. distant), and 58 mi e.s.e. of Bayonne. It is a favorite winter resort, enjoying a mild, dry climate and a peculiar stillness of the atmosphere, with no sudden variations of temperature. Population, 25,879.

**Paul**, the apostle, commonly called Saint Paul, was b. of Jewish parents at Tarsus, in Cilicia. He went to Jerusalem to study under Gamaliel, one of the most celebrated Jewish rabbins. Thus prepared for the office of teacher, he joined the sect of the Pharisees, and became a persecutor of the Christians. He was present at and encouraged the stoning of Stephen, and it was only when he was overtaken by a vision on his way to Damascus that he became a convert to Christianity. Arabia, Syria, Asia Minor, Greece, and the islands of the Mediterranean were the scenes of his labors. The churches of Philippi in Macedonia, of Corinth, Galatia, and Thessalonica, honored

## Paul

him as their founder; and he wrote epistles to these churches, and to the churches in the chief cities of Greece and Asia Minor. He went to Jerusalem, and was there arrested and brought to Casarea, where he was kept a prisoner for two years by the Roman governors Festus and Felix. He appealed, as a Roman citizen, to the emperor; and on his way to Rome, where he arrived in the year 62, he was shipwrecked on the island of Melita. According to the tradition of the early church he suffered martyrdom during the reign of Nero.

**Paul**, the name of five popes. **PAUL I**, pope from 757-767, brother of Stephen II, stood on good terms with Pepin and Charlemagne. **PAUL II**, pope from 1464-71, a native of Venice, originally called Pietro Barbo, caused a crusade to be preached against the Hussites. **PAUL III**, pope from 1534-49, formerly Alessandro Farnese, was a zealous defender of the Church and did much to suppress heresy. Among the important events of his position were the publication of a brief condemning slavery, the excommunication of Henry VIII of England, the approval of the Order of Jesuits and the convocation of the Council of Trent. He was a great patron of art and appointed Michelangelo architect in chief of the Vatican and St. Peter's. **PAUL IV**, Pope from 1555 to 1559, joined France in the war for the conquest of Naples (1555-57). **PAUL V** was Pope from 1605 to 1621. His pontificate was marked by the interdict laid on Venice and the establishment of the Congregation of the Oratory and of the Ursuline and Visitation.

**Paul I** (1754-1801), emperor of Russia, son of Peter III and Catherine II. On the death of Catherine in 1796 he succeeded to the throne. He put an end to the war with Persia, and liberated the Poles who were in confinement in Russia. He joined the coalition of crowns against France, but afterward favored the cause of Napoleon. Paul caused himself to be declared Grand-master of the Knights of Malta (1798), but Britain, having conquered the island in 1800, refused to surrender it to the Russian emperor. He therefore laid an embargo on all British ships in the Russian ports, and prevailed upon the Swedish, Danish, and Prussian courts to enter into a convention against Great Britain.

**Paulding**, **JAMES KIRKE** (1779-1860), miscellaneous writer, b. in Dutchess co., N. Y. He removed to New York, where he became intimately acquainted with Washington Irving, and published in connection with him a series of humorous and satirical essays, entitled *Salmagundi*. For some years he was secretary of the U. S. navy. He published a second series of *Salmagundi*, entirely his own composition; several novels, among which are *Königsmarke*; and the *Dutchman's Fireside*; a *Life of Washington*; and many political pamphlets, poems, etc.

**Pauncefote**, **JULIAN**, **LORD** (1828- ), an English statesman and diplomat; b. at Munich, Sept. 13, 1828; educated at Paris, Geneva, and Marlborough College. He was admitted to the bar in 1852. In 1875 he was appointed

## Pawnbrokers

Attorney-General at Hongkong, and acted as judge of the supreme court in 1869 and again in 1872. He was knighted in 1874, and two years later became Under Secretary of Foreign Affairs. In 1888 Sir Julian succeeded Lord Sackville West as British Minister at Washington, and in 1893 was raised to the rank of Ambassador and Minister Plenipotentiary. His greatest diplomatic success has been the completion with Secretary of State Hay of the treaty regulating the construction of a trans-isthmian canal. He has always used his influence to promote a friendly feeling between the two countries. See *Hay-Pauncefote Treaty*.

**Pavement**, a floor or covering consisting of stones, blocks of wood, etc., laid on the ground in such a manner as to make a hard and convenient roadway. Pavements of lava, with elevated sidewalks, are found in the ancient Roman cities of Herculaneum and Pompeii, and the paving of important highways was practised by the Romans. Of modern cities Paris is generally mentioned as having the oldest pavement. Street pavements in modern cities are usually of stone, asphalt, concrete, or wood. The stone commonly used for the carriage way is granite, blocks of which are placed upon a solid bed of concrete, and the interstices filled with sand and grouted with asphalt, lime, or cement. Arbroath and Caithness supply the best paving stones for sidewalks. Concrete pavement is composed of broken stone, etc., mixed with Portland or other cement or asphalt. Val de Travers *asphalte rock* is now commonly used for pavements. Wood pavements have the advantage of being noiseless, but the abrasion of the surface requires frequent repair. They are laid in different ways, but the blocks which form the pavement are always placed on their ends, so that the cross surface of the wood is exposed. The spaces between the blocks are usually filled with gravel, upon which hot tar or pitch is poured.

**Pa'via**, a city of Italy, in Lombardy, 22½ mi. from Milan, on the left bank of the Ticino, capital of a province of the same name. Pavia is still partly surrounded by old walls and fortifications. Of edifices the most important are the cathedral; the church of San Michele; the Castello, or castle, now a barracks; the university; the Collegio Borromeo; etc. The manufactures are unimportant. About 4 mi. to the north is the famous Carthusian monastery Certosa di Pavia. Pavia was a place of considerable importance during the reign of Augustus. It afterward came into the possession of the Lombard kings, who made it their capital. It was latterly under the Milanese. Pop. 29,836. The province, which extends on both sides of the Po, has an area of 1,285 sq. mi., partly covered by the Apennines. Pop. 496,832.

**Pawnbrokers**, persons who lend money on goods *pledged* or deposited with them at a legally fixed rate of interest, and under the restriction of a government license. Although this mode of borrowing is occasionally taken advantage of by all classes, and bankers, when they accept security for their advances, act on

## Pawtucket

the same principle as the pawnbroker, the business, as a special one, originates chiefly in the necessities of the poor. In the Middle Ages lending upon pledges was a trade almost exclusively pursued by Jews and Lombards. On the European continent this form of borrowing is partly conducted by charitable institutions called *Monts de Piété*. In England pawnbrokers were recognized by statute in the reign of James I. The business is regulated by statutes in each of the states.

**Pawtucket**, Providence co., R. I., on Pawtucket River, 4½ mi. n.e. of Providence. Railroads: Providence & Boston; N. Y. N. H. & H.; Old Colony. Water power is furnished by the falls in the river at this point. Industries: immense thread works, employing 2,200 hands, cotton mills, producing 20,000,000 yards of calico yearly, wadding, plush, braid, bleaching and dyeing works, woolen mills, machinery, leather, rope, spool, and file factories, and steam fire engine works. Exports include coal, lumber, brick, cement, etc. Population, 1900, 39,231.

**Paxton**, SIR JOSEPH (1803-1865), landscape gardener and architect, b. in Bedfordshire. He was educated at the free school of Woburn; became gardener, and latterly estate manager to the Duke of Devonshire, at Chatsworth, in Derbyshire; designed the crystal palace for the great International Exhibition (London) in 1851, and soon after was knighted. He was elected member of Parliament for Coventry in 1854, and continued to represent it until his death.

**Paymaster**, an officer in the army and navy, from whom the officers and men receive their wages, and who is intrusted with money for that purpose. In matters of general discipline the paymaster is subordinate to the commanding officer of his regiment; but in regard to the immediate duties of his office he is directly responsible to the war office. The paymaster of a ship in the navy has a general charge of the financial department in the vessel.

**Payne**, HENRY B. (1810-1896), b. in New York. He was educated at Hamilton College, New York, and later he practised law at Cleveland, O. In 1849 he was elected state senator of Ohio. He was elected to Congress in 1875, and U. S. senator from Ohio in 1885.

**Payne**, HENRY C. (1843-1904), an American politician, born at Ashfield, Massachusetts. He removed to Milwaukee, Wisconsin, in 1863, and soon became interested in public affairs, serving consecutively as secretary and chairman of the Republican County Committee, secretary and chairman of the Republican State Central Committee, and member of the Republican National Committee (1880). From 1876-86 he was postmaster in Milwaukee. In 1888-92 he was a delegate to National Republican Conventions. Subsequently, he held a number of city offices, and in 1893-95 was receiver of the Northern Pacific Railroad. In 1902 he was appointed Postmaster-General of the United States, and served in that capacity until his death in 1904.

**Peabody**, GEORGE (1795-1869), philanthropist, b. at Danvers, Mass. In 1837 he went to London and established the firm of George Pea-

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body & Co., exchange brokers and money lenders. Having acquired a large fortune he gave \$200,000 to establish a free library in his native town; presented \$1,000,000 to found a free library and institute of art and science at Baltimore; and in 1862 placed \$750,000 in the hands of trustees for the benefit of the poor of London, to be employed in building model dwelling houses. He afterward added \$1,750,000 to this benefaction. In 1866 he made a gift of \$2,100,000, afterward increased to \$3,500,000, for the cause of education in the South.

**Peabody**, Essex co., Mass., 16 mi. n.e. of Boston. Railroad, Boston & Maine. Seat of Peabody Institute. Leather manufacture is the chief industry. Pop. 1900, 11,523.

**Peace Congress at The Hague.** The Peace Congress which assembled at The Hague, Holland, on May 18, 1899, was called by Czar Nicholas II of Russia. On August 24, 1898, he caused a note to be sent to the foreign diplomats at St. Petersburg, pointing out the necessity of a general convention for discussing the maintenance of peace throughout the world and the general disarmament of nations. The note, which was sent by Count Muravieff, is as follows:

"The maintenance of peace and the possible reduction of the excessive armament which weigh upon all nations present themselves in existing conditions to the whole world as an ideal toward which the endeavors of all governments should be directed. The humanitarian and magnanimous ideas of his majesty the emperor, my august master, have been won over to this view in the conviction that this lofty aim is in conformity with the most essential interests and legitimate views of all the powers; and the imperial government thinks the present moment would be very favorable to seeking the means. International discussion is the most effectual means of insuring all people's benefit—a real durable peace, above all, putting an end to the progressive development of the present armaments. In the course of the last twenty years the longing for general appeasement has grown especially pronounced in the consciences of civilized nations, and the preservation of peace has been put forward as an object of international policy. It is in its name that great states have concluded between themselves powerful alliances.

"It is the better to guarantee peace that they have developed in proportions hitherto unprecedented their military forces and still continue to increase them without shrinking from any sacrifice. Nevertheless, all these efforts have not yet been able to bring about the beneficent result desired—pacification. The financial charges following the upward march strike at the very root of public prosperity. The intellectual and physical strength of the nation's labor and capital are mostly diverted from their natural application and are unproductively consumed. Hundreds of millions are devoted to acquiring terrible engines of destruction, which, though to-day regarded as the last word of science, are destined



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to-morrow to lose all their value in consequence of some fresh discovery in the same field. National culture, economic progress, and the production of wealth are either paralyzed or checked in development. Moreover, in proportion as the armaments of one power increase, they less and less fulfill the object the government has set before themselves.

"The economic crisis, due in great part to the system of armament *à l'outrance* and the continual danger which lies in this massing of war material are transforming the armed peace of our days into a crushing burden which the people have more and more difficulty in bearing. It appears evident that if this state of things were to be prolonged it would inevitably lead to the very cataclysm it is desired to avert, and the horrors whereof make every thinking being shudder in advance. To put an end to these incessant armaments and to seek the means of warding off the calamities which are threatening the whole world—such is the supreme duty to-day imposed upon all states. Filled with this idea, his majesty has been pleased to command me to propose to all the governments whose representatives are accredited to the imperial court the assembling of a conference which shall occupy itself with this grave problem.

"This conference will be, by the help of God, a happy presage for the century which is about to open. It would converge into one powerful focus the efforts of all states sincerely seeking to make the great conception of universal peace triumph over the elements of trouble and discord, and it would, at the same time, cement their agreement by a corporate consecration of the principles of equity and right, whereon rest the security of states and the welfare of peoples."

This radical proposition was the subject of universal discussion. By some it was received with the highest approval, by others it was regarded as desirable but unattainable, while others condemned it as absurd. However, the sincerity of the Russian emperor was not questioned in this matter, and steps were at once taken by the various governments to appoint representatives to the conference. The questions which should come before this congress were much discussed. Since all the troubles to which nations are heir might be discussed in such a body, limitations began to be set and the questions which the consensus of opinion decided were proper for discussion were mainly as follows:

First and foremost was the proposition not to increase the naval or military forces for a fixed period; secondly, the question of reducing the forces and appropriation for the same in the future; on account of the continued improvement of the firearms and engines of war in general which render useless to-day what was yesterday considered the greatest armament possible, it was proposed to interdict the use of any new weapon of a power fuller than those now in use. In fact, it was considered advisable to forbid the employment of some of the contrivances as submarine tor-

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pedoes that are now in use. It was proposed also to formulate a declaration concerning the laws and customs of war. One of the foremost proposals was a declaration of the principles of mediation and arbitration in all cases.

The congress was invited by Queen Wilhelmina of The Netherlands to meet at The Hague, and the invitation was accepted. The congress met May 18, 1899, and was received with every mark of respect by the government of The Netherlands. In view of the great world questions which were to come before this congress each nation sent as delegates some of its greatest thinkers and diplomats. The conference was organized as by previous understanding with M. de Staal, the Russian ambassador to Great Britain, as president. The nations represented were the six great European powers and some eight smaller European states, four Asiatic governments, and the United States. The four Asiatic powers were China, Japan, Persia, and Siam. The conference immediately appointed committees and sub-committees upon the various lines of work outlined, and these committees immediately went into secret session to receive the various propositions to be offered by the representatives, and to report upon the same to the general committees and to the general congress.

The general conference met every few days to hear and consider the reports of the various committees.

On the 29th of July the congress was brought to a close and the signatures of the various documents took place.

Although the conference was summoned by the Russian Emperor primarily to discuss disarmament the delegates ignored the main object and gave their attention more to mediation and arbitration.

In regard to disarmament the delegates contended themselves with a declaration as to the desirability of an arrest in the increase of the armaments.

Convention No. 1, as signed by the delegates, forbids (1) the use of balloons to drop explosives from the sky to injure combatants; (2) the use of asphyxiation shells; and (3) the use of expanding bullets. The American and English delegates declined to sign the second and third clauses of this agreement.

Convention No. 2 applied the provisions of the Geneva convention to naval warfare. [See *Geneva Convention*.]

Convention No. 3 embodied a perfected code of the rules of war based on the Brussels rules. [See *International Law*.]

Convention No. 4, the great achievement of the conference, makes mediation an international duty and provides for the establishment of a permanent court of arbitration with a bureau at The Hague. It also makes it the duty of all governments to encourage the submission of disputes to the court and provides for the elaboration of a complete code of arbitration procedure.

*Arbitration and Mediation Treaty*.—Convention No. 4 in the form of a treaty was sub-

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mitted to the United States Senate by President McKinley December 20, 1899, and ratified by that body February 5, 1900. It had been signed at The Hague in July, 1899, by the American representatives, Andrew D. White, Stanford Newel, Seth Low, Capt. Wm. Crozier, Capt. A. T. Mahan, and F. W. Holls. On account of the extreme importance of this treaty and the universal interest in it we present a summary of each of the articles.

The treaty embraces two stipulations: first, as to mediation; second, as to arbitration. It comprises fifty-seven articles, and as far as the United States is concerned, a special proviso specifying this country's adherence to the Monroe Doctrine.

The four titles of the treaty are as follows:—

Title first—The maintenance of general peace.

Title second—Of friendly offices of mediation.

Title third—Of international commissions of inquiry.

Title fourth—Of international arbitration.

Chapter I.—Of arbitral judgment.

Chapter II.—Of the permanent court of arbitration.

Chapter III.—Of the arbitral procedure.

The treaty is too long to print in full in this book. The following is a careful summary of the provisions of the convention:—

### TITLE FIRST.—THE MAINTENANCE OF GENERAL PEACE.

ART. 1. The signatory powers agree to use all their efforts to prevent as much as possible the recourse to force, in the relations between states.

### TITLE SECOND.—OF FRIENDLY OFFICES AND MEDIATION.

ART. 2. In case of dissension or conflict, the powers agree to have recourse to the friendly offices or to the mediation of one or more friendly powers.

ART. 3. One or more of the powers which have no part in the conflict may offer their friendly offices or mediation to the states in conflict, the offer not to be considered an unfriendly act.

ART. 4. The duty of a mediator was to conciliate the opposing claims and appease the resentment.

ART. 5. The duties of a mediator cease whenever it is officially declared by either party to the strife, or by the mediator himself, that the methods of conciliation proposed are not accepted.

ART. 6. Friendly offices and mediation have solely the character of advice, and are never binding.

ART. 7. The acceptance of mediation will not have the effect, in the absence of an agreement to the contrary, to stop preparations for war, nor in case the conflict is in progress, to interrupt the same.

ART. 8. In case of threatened war, the states

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in conflict will each choose a power to which they will confide the duty of negotiating with the power chosen by the other side, for the purpose of preventing the breaking off of peaceful relations. The term of such negotiation shall not exceed thirty days. In the meantime the principals will attempt no negotiation. In case the mediating powers can not prevent war, they are to use all means to re-establish peace.

### TITLE THIRD.—OF INTERNATIONAL COMMISSIONS OF INQUIRY.

ART. 9. In controversies arising from a difference in regard to questions of fact, the powers should establish an international commission of inquiry to determine the facts by means of an impartial and thorough inquiry.

ART. 10. These commissions are to be constituted by the parties to the controversy, who shall specify the facts to be examined and regulate the procedure of the commission.

ART. 11. These commissions are to be formed in the manner pointed out in ARTICLE 31.

ART. 12. The powers in controversy agree to do all in their power to aid the commission of inquiry to determine the facts.

ART. 13. The commission of inquiry shall present a report signed by all the members of the commission.

ART. 14. The report of the commission has to do only with questions of fact, and has not the character of an arbitral judgment; the powers are free to act upon the report as they see fit.

### TITLE FOURTH.—OF INTERNATIONAL ARBITRATION.

#### Chapter I. Of Arbitral Judgment.

ART. 15. International arbitration has for its object the determination of controversies between states by judges of their own choice, upon the basis of respect for law.

ART. 16. In questions of a judicial character, especially as to treaties, arbitration is acknowledged an efficacious and just method of deciding controversies which have not been determined by diplomacy.

ART. 17. An agreement of arbitration may be made in reference to present or future disputes, and may relate to all kinds of controversies or to those of a particular character only.

ART. 18. Agreement to arbitration implies the obligation to accept in good faith the decision of the tribunal.

ART. 19. Either before or after the ratification of this act the powers reserve the right to make new agreements with a view to extending the obligation to submit disputes to arbitration.

#### Chapter II.—Of the Permanent Court of Arbitration.

ART. 20. The powers agree to appoint a permanent court of arbitration, always to be open and ready to proceed in accordance with the rules of procedure included in the present convention.

## Peace Congress at The Hague

ART. 21. This court shall have jurisdiction over all cases of arbitration unless the parties have agreed upon special arbitration.

ART. 22. An international bureau shall be established at The Hague, which shall serve as a clerk's office for the court. This bureau shall be the medium of communication, and shall preserve the court's archives. The powers agree to communicate to the bureau a copy of every agreement of arbitration and every judgment of an arbitral tribunal.

ART. 23. Within three months after the ratification of this act, each power shall name not to exceed four persons who are willing to be arbitrators. The same person may be named by different powers. Members of the court shall be appointed for a term of six years, and may be reappointed.

ART. 24. When the powers wish to bring a question before the court, the choice of arbitrators selected to constitute the tribunal shall be made from the general list of members of the court.

Unless otherwise specified, the tribunal shall be formed by each party naming two arbitrators, who shall choose an umpire. The bureau shall then arrange for the meeting.

ART. 25. The tribunal shall ordinarily sit at The Hague.

ART. 26. The international bureau shall be at the disposal of the arbitral tribunal. The court may act in controversies between powers that are not parties to this convention, or between parties who have and parties who have not signed it, by special agreement.

ART. 27. The powers agree to remind states in controversy that the permanent court is open to them — this to be considered a friendly act.

ART. 28. The diplomatic representatives of the signatory powers at The Hague shall constitute a permanent administrative council with the Minister of Foreign Affairs of the Netherlands as president. This council organizes the international bureau, and shall direct and control the same; it shall notify the powers of the constitution of the court, determine the rules of practice, decide administrative questions relating to the court's official duties; it shall make an annual report to the powers as to what has been done by the bureau.

ART. 29. The expenses of the bureau shall be borne by the powers.

### *Chapter III.—Of the Arbitral Procedure.*

ART. 30. The powers agree upon the following rules of procedure unless the parties agree upon different rules.

ART. 31. Powers which resort to arbitration shall sign a special submission stating the subject of the litigation and extent of the powers of the arbitrators. This implies acceptance of the final decision.

ART. 32. The powers of the court may be conferred upon one or more arbitrators as designated by the parties to the controversy; or they may be selected from among the members of the permanent court established by this act. In case the parties do not agree

## Peace Congress at The Hague

upon the constitution of the tribunal it shall be formed as specified in ART. 24.

ART. 33. When a sovereign or the head of a state is chosen as arbitrator, the method of procedure shall be determined by him.

ART. 34. The umpire shall preside over the tribunal.

ART. 35. In case of death, resignation, or absence for any cause of one of the arbitrators the vacancy shall be filled as per the original method of appointment.

ART. 36. Unless otherwise specified by the parties to the controversy, the tribunal shall sit at The Hague.

ART. 37. The parties have the privilege of naming agents, attorneys, or counsel, to represent them.

ART. 38. The tribunal shall decide upon the languages which may be used at its sessions.

ART. 39. The arbitral tribunal may in general be divided into two distinct parts: the examination of evidence and the hearing; the latter to consist merely in the oral discussion of the matters presented by the parties before the tribunal.

ART. 40. Every document produced by one party shall be communicated to the other.

ART. 41. The oral hearings shall be under the direction of the president. They shall be published as the tribunal directs, and with the consent of the parties. After the taking of evidence has been closed, the tribunal may exclude from the hearing the presentation of other evidence by either party without the consent of the other.

ART. 42. The examination of evidence being closed, the tribunal has the right to exclude all new acts or documents submitted by one party without the consent of the other.

ART. 43. The tribunal, however, shall have the right to consider additional evidence submitted by either party, but said evidence must be made known to the other party.

ART. 44. The tribunal, moreover, may require the parties to produce all official documents, and in case of refusal may enter notice thereof upon its records.

ART. 45. Counselors for the parties are authorized to present all the pleas that they deem useful.

ART. 46. Counsel has the right to take exceptions and raise objections, the tribunal to rule finally on same.

ART. 47. Members of the tribunal may put questions to the attorneys of the parties and demand further explanations on doubtful points.

ART. 48. The tribunal is authorized to determine its own jurisdiction, by interpreting the submission, as well as any other treaties invoked in the matter, and also by applying the principles of international law.

ART. 49. The tribunal has the right to make rules of procedure for the direction of litigation.

ART. 50. When the counselors have presented their explanations and briefs, the tribunal shall declare the hearing closed.

ART. 51. Deliberations of the tribunal shall



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be had in secret session. A decision shall be had by a majority vote. If any member refuse to vote, the fact shall be stated.

ART. 52. When the decision shall have been made by a majority vote, it shall be accompanied by an opinion in writing and signed by each member of the tribunal.

ART. 53. The decision shall be read at a public session of the tribunal.

ART. 54. The decision shall decide the controversy finally and without appeal.

ART. 55. The parties may, however, reserve in their submission the right to ask for a revision of this arbitral judgment. The same can be asked, however, only upon the discovery of additional evidence of a character to influence the judgment.

ART. 56. The decision is binding only upon the parties to the controversy. When it consists in the interpretation of a convention in which powers other than those in the immediate controversy are interested, the parties shall notify the other interested powers. Each of these other powers may take part in the proceedings, in which case the decision shall be binding upon them also.

ART. 57. Each party to the controversy shall bear its own expense, and an equal part of the expense of the tribunal.

*Special Proviso.* [Accompanying the signatures of the American delegates].—Nothing contained in this convention shall be so construed as to require the United States of America to depart from its traditional policy of not intruding upon, interfering with, or entangling itself in the political questions or internal administration of any foreign state; nor shall anything contained in the said convention be so construed as to require the relinquishment by the United States of America of its traditional attitude toward purely American questions. [This refers to the Monroe Doctrine.]

**Peach**, a fruit closely allied to the plum and cherry. The peach is one of the most delicious fruits of temperate climates. It thrives best in a loose, sandy soil and in localities having a large number of warm, sunshiny days. It is cultivated more extensively in the United States than in any other country. Its range is from the Gulf of Mexico to southern New England and the shores of Lake Ontario and Lake Michigan.

The tree is small, rarely exceeding twenty-five feet in height, and has small, willow-shaped leaves. The blossoms appear in early spring before the leaves and are a light pink or a pale blue. The fruit has a fuzzy skin and contains a rough, hard pit or stone. When ripe the fruit becomes a soft fleshy drupe. There are many varieties of peach under cultivation. See colored plate, **Fruit—Apple**.

**Peale**, REMBRANDT (1778–1860), artist, b. in Bucks co., Pa. When 17 years old executed a portrait of Washington, from whom he had three sittings. He painted portraits of many distinguished men. He was president of the American Academy, and also one of the original members of the Academy of Design. His

## Pearl

portrait of Washington (1823) was purchased by Congress.

**Peanut.** See *Groundnut*.

**Peanut Oil**, the oil of the groundnut or peanut. In its manufacture the meats of the nuts are ground to a fine flour which is heated and packed into woven bags of horsehair called scrutins. The bags are placed in a hydraulic press which presses out the oil. After the first pressure the meal is removed and heated to a temperature of about 160 degrees and pressed again. The oil obtained at the second pressing is of an inferior quality and is worth only about half as much as that obtained at the first pressing. Peanut oil is used for making salads and in the manufacture of fine white soaps. The refuse left in the scrutins is a valuable food for cattle and sheep.

**Pear**, a tree growing wild in many parts of Europe and Asia, and from which the numerous cultivated varieties have originated. The fruit is characterized by a saccharine aromatic juice, a soft and pearly liquid pulp, melting in the mouth, as in the butter pear; or by a firm and crisp consistence, as in the winter bergamots. The pear is chiefly propagated by grafting or budding on the wild pear stock, or on stocks raised from the seeds of cultivated pears, called free stocks. It is also grafted on the quince, the medlar, and the white thorn. At the present day more than 200 varieties are enumerated, and constant accessions are made every year. France and the north of Italy are celebrated for the perfection to which they have carried the culture of this fruit. Numerous varieties are cultivated solely for the purpose of making perry, a liquor analogous to cider, and prepared nearly in the same manner. The wood is fine-grained, of a yellowish color, and susceptible of a brilliant polish. In the early ages of Greece it was employed in statuary.

**Pearl**, the name applied to a concretion produced within the shells of certain species of bivalve mollusks as the result of some abnormal secretory process. These concretions are highly valued, and are classed among the gems. The production of a pearl is generally begun by the introduction of some foreign body, such as a grain of sand, within the mantle-lobes. The presence of this body has the effect of setting up an irritant action, resulting in the deposition by the mantle of a quantity of nacreous material over the offending particle. This material, in certain species of mollusks, is of such a texture and character, and is so deposited in regular laminæ or layers, that in due time the structure known as a "pearl," varying in worth and brilliancy, is formed. Chief among such mollusks are the pearl-oyster, the pearl-mussel, and the fresh-water mussels.

The chief pearl-oyster fisheries are those of Ceylon, which, together with the fisheries in the Persian Gulf, were known to the ancients. The chief seat of the Ceylon fishery is in the Gulf of Manaar, on the northeast of the island. It begins in February or March, and extends over a period of about a month, a large fleet of boats being usually engaged in it. The ver

## Peary

age depth at which the oysters are found varies from 60 to 70 ft., and the divers are let down by a stout rope weighted by a heavy stone. Having gathered a number of the oysters into a net, at the end of half a minute or so the diver is pulled up. The oysters being carried to shore, and laid in piles, in about ten days become thoroughly decomposed. They are then thrown into sea water, and carefully examined for pearls; while the shells, after being cleaned, are split into layers for the sake of the mother-of-pearl. The pearl-fisheries of Ceylon are a government monopoly, but the revenue derived from them is not a regular one, the fishery sometimes failing for years in succession. There was no fishery, for example, between 1837 and 1854, or between 1863 and 1874. The best pearls are found about Ceylon, Persia, and other eastern coasts. The pearl oyster occurs throughout the Pacific. Very fine pearls are obtained from the Sulu Archipelago on the northeast of Borneo. Of late years pearl-fishing has been started with considerable success in Australian seas; and it is carried on also in the Gulf of Mexico, upon the coast of California, and in the vicinity of Panama.

Pearls have formed valued articles of decoration and ornament from the earliest times. Julius Cæsar presented Servilia, the mother of Marcus Brutus, with a pearl valued in modern computation at \$240,000, while Cleopatra was said to have swallowed one gem valued at \$300,000 or \$400,000. The "Pilgrim" pearl of Moscow is diaphanous in character, and weighs 24 carats.

Artificial pearls are largely made in France, Germany, and Italy. They are very well imitated by the scales of certain fishes. A substitute for black pearls is found in close-grained hæmatite, not too highly polished, and pink pearls are imitated by turning small spheres out of the rosy part of the conch shell.

**Peary**, ROBERT E., Arctic explorer, b. in Pennsylvania in 1854. He was graduated from Bowdoin College, and in 1885 became civil engineer in the U. S. navy. He has made four expeditions to the Polar regions, in 1888, 1891, 1893 and 1899. In this latest expedition (1899-1902) he reached the highest point yet attained in the Western Hemisphere (84° 17' n.). See *North Polar Expeditions*.

**Peasants' War**, a great insurrectionary movement among the German peasantry, which in 1525 spread over the whole of Germany. The immediate cause of this movement was religious fanaticism, but the pent-up forces by which it was impelled grew out of the long course of oppression to which feudal customs had subjected the people.

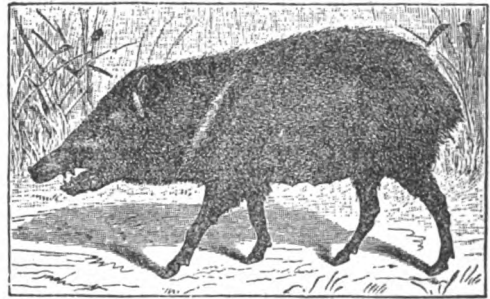
**Peat**, a kind of turfy substance consisting of vegetable matter which has accumulated by constant growth and decay in hollows or moist situations on land not in a state of cultivation, always more or less saturated with water, and consisting of the remains, more or less decomposed, of mosses and other marsh plants. Peat is generally of a black or dark brown color, or when recently formed, of a yellowish-brown; it is soft and of a viscid consistence, but it be-

## Pecten

comes hard and darker by exposure to the air. When thoroughly dried it burns, giving out a gentle heat without much smoke; accordingly it is used as fuel in those countries where it abounds, as in Scotland and Ireland. It often covers large areas, forming what are called peat-bogs, and in these the accumulation of solid peat may reach a great depth, sometimes 50 ft. or more. When prepared for fuel in the ordinary way it is dug from the bog in rectangular brick-like masses, which are set up to dry on the spot, and when sufficiently dried are carried away and stacked. Peat, as it is cut from the bog, contains from 80 to 90 per cent. of water, and when air-dried it retains a proportion of water equal to from 15 to 25 per cent. of the whole weight. To increase its value as fuel several methods have been adopted; but in any successful process for treating peat it must be condensed by artificial means, and the water must be expelled and dried out economically.

**Pecan'** (Pecan-nut), a species of hickory and its fruit, growing in North America. It is a large tree, with hard, very tough wood, pinnate leaves, and catkins of small flowers.

**Pec'cary**, a genus of quadrupeds nearly allied to the swine, in which family it is classified. These animals are exclusively confined



Peccary.

to America. In general form the peccaries resemble small pigs. The best known species are the collared peccary and the white-lipped peccary. The former occurs abundantly in South America, and also extends into North America, living generally in small flocks, which do not hesitate to attack with their tusks any one who meddles with them. Their food consists of maize, potatoes, sugar canes, and similar materials; and cultivated fields suffer much from their raids. This species of peccary is readily domesticated. The flesh is savory, and less fat than pigs' flesh. The peccary possesses a glandular sac or pouch, situated in the loins, which secretes a strongly smelling fluid of foetid nature. This must be cut away immediately on killing a peccary, to avoid contaminating the flesh.

**Pecos River**, a river of New Mexico and Texas, which has a southeasterly course of about 800 mi., and falls into the Rio Grande del Norte, but in summer is generally dry.

**Pecten**, a genus of Mollusca, included in the

oyster family, and popularly designated under the name of "scallop shells." Numerous species of pecten—180 or more—are known. The common pecten and the frill or great scallop are the most common forms. The latter form is esteemed a delicacy, and as such is sold in the London markets. The shell of this species was borne in the Middle Ages by pilgrims in their hats, as a sign that they had visited the Holy Land. The shell is somewhat rounded, and terminates superiorly in a triangular "ear," in which the hinge exists. The name "pecten" is derived from the indentation of the edges and surfaces of the shell.

**Pectose**, an important ingredient of the vegetable kingdom constituting the base from which are derived all the jelly-like substances of fruits and vegetables. Pectose is the most abundant in unripe fruits and the roots of plants. Like cellulose, it performs different functions in different parts of the plant; as giving hardness to green fruits, and other quality to roots. It is partially soluble, and extremely perishable. On this account, it seems impossible to procure pectose in a free state so as to purify it and determine its composition. It is supposed to be a carbohydrate; that is, a substance containing oxygen and hydrogen in the proportions in which they form water. In the process of ripening of fruit pectose turns a ferment called *pectase* into pectin or plant-jelley. Leading chemists realize the importance of pectose and are striving to discover some method to more fully understand its composition.

**Pedagogics or Pedagogy**, the science and art of teaching. The term is derived from *pedagogue*, which comes from a Greek word meaning a leader of children. The Greek pedagogue was a slave who acted as the attendant and protector of a child. Later the Romans applied the term to the slave who taught the child Greek. From this the significance of the term was transferred to one who teaches. *Pedagogics* has a narrower application than education; the term applies only to the principles and theories of education, whereas *education* is applied not only to the application of these principles and theories, but also to the establishing of whatever measures and systems may be necessary for this purpose. "Pedagogy, so to speak, is the theory of education, and education the practice of pedagogy."

The laws of psychology are the rules of teaching; consequently pedagogy is a derived science and is based on psychology. For this reason the study of psychology should precede the study of pedagogy. Since the principles of teaching apply to all phases of instruction, pedagogy is also related more or less directly to all sciences found in courses of study. It relates to biology and physiology in physical education; to logic, mathematics and the natural sciences in intellectual education; and to history, literature and ethics in moral education.

In the article *Education*, an account is given of the general trend of the various educational

movements from ancient to modern times, and in the discussion of pedagogics, the successive methods employed are given attention.

While every educational system has been established for a definite purpose and the principles and theories adopted by its founders were such as they believed would lead up to their ideal, and while all systems contain some principles that are fundamental, yet those established previous to the Christian era have so little bearing upon modern theories and methods that their consideration is not necessary in a brief account.

**I. THE HUMANISTS. The Early Christian Fathers.**—The period of the Humanists extends from the founding of Christianity through the Middle Ages. Their theories and principles were the result of their purposes and ideals. Christianity set up new standards of life and revolutionized the thought of its followers. The purpose of education among the early Christians was to be able to interpret the Scriptures and to explain the subtle truths of their religious belief. Education was consequently placed under the care of the church, and the early Christian fathers were the first of these educators. With few exceptions, reading and writing in Greek or Hebrew and religion were the only subjects taught. Most of the leaders in the church proscribed Latin and Greek authors, as their literature was that of the pagan world. The methods of instruction were dictatorial and arbitrary. Pupils were taught words before things, and unquestioned acceptance of the statements of their teachers. Independent thought or original investigation was not considered. While some of these early teachers admitted the Latin and Greek classics, the same methods of instruction were employed by all.

**The Schoolmen.**—The age of the Fathers was followed by that of the Schoolmen, and to this period most of the education of the Middle Ages belongs. During the greater part of the period, three systems of education were running parallel. These were monastic education, knightly education and secular education. Each of these systems was in marked contrast to the others. By the seventeenth century, monasteries were scattered through all the countries that had composed the Roman Empire. The prejudice against pagan writers had disappeared and the educational work of these schools was much broader than at the beginning of the era. The course of instruction embraced the seven liberal arts, which were divided into two classes, the trivium and the quadrivium. The first included Latin grammar, logic and rhetoric; the second, arithmetic, geometry, astronomy and music. Reading and writing were included under grammar. The completion of the course required seven years; all secular studies were pursued with reference to their interest to the church and the Latin language was taught to the universal neglect of the mother tongue. Later, logic absorbed the attention of the Schoolmen, who applied it to the development of theology. This produced a class of scholars who were



noted for their ability to develop abstract theories and their skill in reasoning on abstruse points of theology. Both their system of education and methods of instruction tended to withdraw these men from the world and to abnormally develop the memory and reason at the expense of the other powers. The educational system of the Schoolmen was unbalanced, but its methods became so firmly established that they have had a molding influence on the educational systems and theories of all succeeding centuries, and the great schools of some monastic orders, particularly the Benedictines, were at that time the leading educational institutions of the world.

Knightly education was the direct opposite of monastic. Its purpose was to fit the youth for the world. He was trained for war and the chase, to be truthful and to reverence women. He ignored the literature of Greece and Rome, but became reasonably conversant with his native language and dwelt upon the works of nature as the source of the noblest sentiments and purest joys. His inspiration was the love of glory and his ideal the knightly hero. Knightly education had a modifying influence on succeeding systems, though it contained but little that was of practical value.

The secular education of the town or burgher schools had its origin in the necessities arising from the industrial conditions of the age. It was the practical education of its time and gave special attention to reading and writing of the mother tongue, arithmetic, geography and history. In some schools, music and Latin were also added. These schools were under the supervision of the church and the methods of instruction were similar to those employed in the monastic schools; their course of study became, under the skillful direction of John Sturm, the foundation of that graded system of instruction that shaped the schools of Germany, England and America for three hundred years.

The Humanists based their system on the works and teachings of those who had preceded them in both the Christian and pagan world. While they infused the spirit of Christianity into much of their work and were inspired by lofty ideals of the relation between man and God, the supreme importance attached to the scriptures and religious tenets made their instruction dogmatic. They also exalted words over things, stifled the spirit of free inquiry, gave undue prominence to formal reasoning and made learning a process of memorizing. Humanistic education failed to secure the development of all the powers of man.

II. THE REALISTS.—The methods and theories of the Realists are in marked contrast to those of the Humanists. This school of thinkers and educational reformers may be said to begin with the ascendancy of Lord Francis Bacon (which see). Bacon is credited with being the originator of inductive philosophy (see *Induction in Logic*), in which inquiry, observation and experiment were substituted for the dictum of authority. Bacon's method is

clearly illustrated in the following extract from Oscar Browning's *History of Educational Theories*: "The lock was to be opened, that was the problem. Other philosophers had tried key after key, each more complicated than the other. Bacon said, take the lock to pieces and examine its mechanism, and you will then be able to make a key which will open it." Bacon not only organized a new method of interrogating nature, but also reclassified the sciences, showing the degree of progress which each had made, and their relation to each other. He was the first to classify pedagogics, or the science of education, as a department of psychology.

While Bacon's system of reasoning was opposed by the Schoolmen, it was welcomed by a class of vigorous thinkers who arose during the early part of the seventeenth century. These men applied Bacon's doctrine to education and promulgated theories which in time caused a strong reaction against the abstract education of the Humanists.

*Ratich*.—The first of these reformers of note in the educational world was Wolfgang Ratke or Ratich. He was a theorist rather than a practical reformer and did not succeed in establishing his theories or in modifying the educational system of his country, yet his aphorisms contain a number of principles which lie at the foundation of the most widely accepted theories of the present day.

*John Amos Comenius*, a Moravian bishop, was a more vigorous and practical reformer than Ratich and may be considered the founder of modern methods of instruction. He was the first who successfully applied Bacon's method of inquiry to the instruction of children. The first reform instituted by Comenius was in the teaching of languages. This he accomplished through his book, *Janua Linguarum Reserata*, or *The Gate of Tongues Unlocked*, which appeared in 1631. This book possessed the following points of merit: (1) It was adapted to the pupil's capacity; (2) the lessons were carefully graded; (3) it taught things in connection with words. This work was translated into all the leading languages of Europe and also into Arabic and one of the languages of India. It revolutionized the methods for teaching language wherever it went. In 1658, an enlarged and revised edition appeared under the title of *Orbis Sensualium Pictus*, or the *Illustrated World of Sensible Objects*, in which all the objects named were accompanied by pictures. This was the first illustrated text book in the world and was for many years the most popular text book of Europe; its introduction was the beginning of systematic training of the powers of observation.

Comenius also gave careful study to the organization of school systems as well as to methods of instruction, and worked out a plan of graded instruction based upon his theories and more complete than that instituted by Sturm. It included four grades of instruction, beginning with the home life of a child where he was first trained by the mother, and extending to the university. According to this sys-

## Pedagogics

tem, the child was to receive an elementary initiation into all studies. Moreover, the mental powers were to be trained in the order of their natural development; viz., observation, memory, imagination and reason. The following principles gleaned from the writings of Comenius will be recognized as constituting the basis of the most generally accepted educational theories of modern times:

"1. Education is the development of the whole man.

"2. Educational methods should follow the order of nature.

"3. Both sexes should receive equal instruction.

"4. Learning should be made agreeable.

"5. There should be an easy gradation in studies.

"6. Things naturally connected in themselves should be joined together in teaching.

"7. Studies should be adapted to the capacity of the pupil.

"8. Nothing is to be learned by heart that is not first thoroughly understood.

"9. Words should be learned in connection with things.

"10. The concrete should precede the abstract; the simple, the complex; the nearer, the more remote.

"11. Things to be done should be learned by doing them."

These principles entitle Comenius to rank as one of the greatest educational reformers of the world. His system and methods aimed at the development of the whole man, but he was far in advance of his time. The thought of the seventeenth century was so strongly wedded to that of the sixteenth, that so radical a change as that which he proposed could only be accomplished in a long term of years.

The conflict between the Humanists and Realists, which began in the seventeenth century, was handed down to the eighteenth and has been transmitted to successive generations, but with a constant convergence of the fundamental ideas in the two systems; and the beginning of the twentieth century saw a wise selection of the best in each, blended in the most advanced educational systems of the world.

**THE NEW EDUCATION.**—The eighteenth century was one of discontent; it was characterized by radical changes in political, religious and educational thought. During the century there was continual controversy between the Humanists and the Realists and, with scarcely an exception, the Humanists were in supreme control of public education, but their methods were to some extent modified by the works of Comenius. Various reformers arose who added much to educational progress. This was done more by their reiterating the principles of Comenius and placing them before the people in a new light and more attractive form, than by adding anything really new in the way of principles and theories. The three most celebrated reformers of this period were Locke, Rousseau and Pestalozzi, all living during the latter half of the century, and Pestalozzi

## Pedagogics

doing his most effective work during the first quarter of the century that followed.

*John Locke* (which see) considered that the mind at birth was like a sheet of blank paper upon which ideas were to be impressed as they were acquired. He gave special attention to physical education and was the originator of the aphorism, "a sound mind in a sound body." He followed Comenius in his idea of teaching the mother tongue before other languages and laid special stress on moral and religious training.

*Rousseau* (which see) was the great educational theorist of his age, and his treatise, *Emile*, was the most influential work of the century. Appearing in 1762, just as the Jesuits were driven from France, and written in an attractive style, it gained public attention and was instrumental in molding public opinion. Rousseau bases his theory upon two fundamental principles: (1) Nature is to be studied and followed; (2) education is an unbroken unity, extending from early childhood to maturity. He follows the method of observation instituted by Comenius and advocates manual training. *Emile* occupies an important place in the study of pedagogics, more on account of its influence than of any new principles which it contained.

*Pestalozzi* (which see) is the reformer to whom the educational progress of the nineteenth century owes the greatest homage. In both Catholic and Protestant countries great efforts had been made toward the development of popular instruction, but the public schools were nevertheless in a wretched condition. Domestic, discharged soldiers, corrupt artisans, degraded students and other grossly unfit persons were employed as teachers. To Pestalozzi, more than to anyone else, is due the reform in these institutions which has given us the primary school as found in Germany and the United States to-day. With the acceptance of Pestalozzi's principles and theories, the New Education may be said to have fairly begun, though a long time has been required for its general extension to the public schools of Europe and America. As summarized by Dr. Payne in *Painter's History of Education*, the principles of Pestalozzi, briefly stated, are:

1. The principles of education are sought in human nature.

2. This nature is organic, consisting of physical, intellectual and moral capabilities, ready and struggling to develop themselves.

3. The function of the educator is both negative and positive. He must remove impediments to the learner's development, and he must also stimulate the exercise of his powers.

4. Self-development begins with sensations received through the senses. These sensations lead to perceptions which, registered in the mind as conceptions or ideas, constitute the basis of knowledge.

5. "Spontaneity and self-activity are the necessary conditions under which the mind educates itself, and joins power and independence."

6. Practical aptness depends more on exer-

cise than on knowledge. "Knowing and doing must, however, proceed together. The chief aim of education is the development of the learner's powers."

7. All education must be based on the learner's own observation; \* \* "this is the true basis of all knowledge."

8. What the learner has gained by his own observation has become an actual possession, which he can explain or describe in his own words.

9. The learner's growth necessitates advancement from the near and actual to the more remote; hence from the concrete to the abstract, from particulars to generals, from the known to the unknown.

All these principles are embraced in the New Education, and the pedagogical movements of the last half of the nineteenth century have been along the line of their application. Attempts to solve the problems of education have been very generally studied under the following phases:

1. *Child Study*.—The study of children from a physiological as well as a psychological point of view, has been prosecuted in Germany and the United States with a good degree of success. Much valuable information has been collected on the rapidity of growth in different years, the condition of the senses as to normal development, and the relation of defective senses to the mental development of the child. The maximum rate and precision of voluntary movement has been tested in thousands of children and the results taken into consideration in the teaching of drawing, writing and oral reading. Endurance and fatigue; aptitudes and interests; the contents of children's minds; the scope of the memory at different ages; the rapidity of improvement in different children of the same age, and many other conditions bearing directly or indirectly upon instruction in the elementary school have been determined and placed before the teachers for their guidance.

2. *The Subject-matter of Education*.—This subject has been the cause of contention between the Humanists, who have placed great stress upon the ancient classics, and the Realists, who consider such subjects as the natural sciences, modern languages and history as the most important. During the last half of the nineteenth century, the more practical subjects have rapidly gained ground in American and German colleges and universities, and the present tendency is to grant them precedence over Latin and Greek. This subject has also caused a great deal of discussion concerning the methods of elementary instruction; these are generally known as the concentric and the historical methods. According to the concentric method, the child is taught only a few central facts in the primary grade, and these are expanded and added to from year to year as his mental development increases. The historical method proceeds on the assumption that the child, during his mental development, passes through substantially the same stages as the race has passed through in reaching its

present stage of civilization. These stages are known as culture epochs; and all subjects containing a human element, such as history and literature, should be arranged to conform to these various culture epochs. The leading advocates of the historical method are the German educators, Ziller and Herbart, and they have found a large following in Germany and America.

3. *Co-ordination and Correlation of Studies*.—These terms mean, respectively, deciding what studies shall be given equal rank in a course of study, and what studies are naturally related to each other. The solution of this problem is largely dependent upon the theory of instruction adopted, and its discussion in the United States is of quite recent origin. It is agreed that such an association of studies as leads each to reinforce the others, enhances the pupil's interest in his work, gives him a better understanding of the subjects, and strengthens his power of volition. Those who believe moral culture to be the greatest aim of education, consider such studies as history and literature of first importance; those who accept the idea of the philosophical unity of knowledge as a basis for co-ordination place the various branches of natural science, ethnology, anthropology and history as the central or knowledge subjects; while others consider that there are independent co-ordinate groups of studies and that the subjects of each group should be correlated according to their natural relations.

4. *Methods of Teaching*.—The dependence of methods of instruction in elementary schools upon the laws of psychology is now universally recognized, and more attention is given to the professional training of teachers than ever before. This result has been brought about very largely through child-study and the study of experimental psychology. The trained teacher understands that instruction is limited by the knowledge, aptitude and interest of the pupils, and that methods of instruction must meet these conditions. The multiplication of normal schools, the establishing of departments of pedagogy in many of the leading colleges and universities of the United States, and the unprecedented growth of pedagogical literature during the last quarter of the nineteenth century are evidence of the general interest in education, and of our progress in perfecting the public school systems of the country. See *Education*; also *Guideposts*, pp. 117, 118, subhead *Education*.

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## Pedestal

*Practice of Teaching*, Page; *Method in the Recitation*, McMurtry; *Philosophy of Teaching*, Tompkins, and *Waymarks for Teachers*, Arnold. On school management: *School Economy*, Wickesham; *The Art of School Management*, Baldwin; *School Management*, White.

**Pedestal**, a base or block on which statues, columns and monuments usually rest. In classic architecture the pedestal was much used. A complete pedestal like a column (which see) has a base and a cornice or sort of capital usually called the sur-base. The part called the dado or die is the shaft or plain block.

**Pedee'**, GREAT AND LITTLE, two rivers. The former rises in North Carolina, enters South Carolina and falls into the Atlantic; total course 360 mi. of which 200 mi. are navigable for boats of 60 or 70 tons. Little Pedee rises in North Carolina, and enters the Great Pedee 32 mi. above its embouchure.

**Pedicellariae**, certain minute organisms or structures found attached to the skin or outer surface of star fishes, sea urchins, and other Echinodermata. Each pedicellaria consists essentially of a stalk attached to the organism, and bearing at its free extremity two or more movable blades or jaws, which close and open on foreign particles so as to retain them. The exact nature of these structures is still a matter of doubt.

**Pediment**, in classic architecture, the triangular mass resembling a gable, above the entablature at the end of buildings or over porticoes. The pediment is surrounded by a cornice, and is often ornamented with sculpture. The triangular finishings over doors and windows are also called pediments. In the debased Roman style the same name is given to these same parts, though not triangular in their form. In the architecture of the Middle Ages small gables and triangular decorations over openings, niches, etc., are called pediments.

**Peddlers** are itinerant dealers who carry their goods from place to place for sale. In the U. S. they are denominated hucksters and are regulated by license in most cities. In England they are called hawkers.

**Pedometer** is an instrument like a watch, which serves to indicate the distance a pedestrian traveler has gone, or rather the number of paces he has made. See *Cyclometer*.

**Pedro II** (1825-1891), ex-emperor of Brazil, was b. at Rio Janeiro, succeeded to the throne on the abdication of his father, Dom Pedro I, in 1831. Brazil prospered greatly under the rule of Pedro II, who did much to develop its resources in every direction. In 1871 he issued an imperial decree for the gradual abolition of slavery, which totally ceased in Brazil in May, 1888. He made several visits to Europe, and was deposed by the revolution of November, 1889.

**Peekskill**, Westchester co., N. Y., on Hudson River, 42 mi. n. of New York. Railroad, N. Y. C. & H. R. Industries: underwear factory, flouring mill, five iron foundries, hat and shirt factories, machine shops, and electrical works.

## Peipus

Surrounding country agricultural. The village was first settled in 1764. Pop. 1900, 10,358.

**Peel**, SIR ROBERT (1788-1850), British statesman, was b. near Bury in Lancashire. He was sent to Harrow and Oxford, where he took his bachelor's degree in 1808, with double first-class honors. Immediately on attaining his majority he was elected member of Parliament for Cashel; in 1810 he became under-secretary of state for the colonies, and in 1812-18 he was chief secretary for Ireland. In 1817 he was elected representative of the University of Oxford. In 1822, under the Liverpool ministry, he became home secretary. Refusing to take office under Canning, he joined the ministry of the Duke of Wellington in 1828 as home secretary. In 1830 he succeeded his father as baronet. In the election of 1832 he was returned for Tamworth, for which he continued to sit during the remainder of his life. On the dismissal of the Whig government in 1834 Peel undertook the government, but his party in the house being in a minority the task was hopeless. The general election of 1841 gave him a large majority, and the formation of a Conservative ministry could no longer be delayed. In 1844 and 1845 he passed his celebrated English and Scotch Banking acts. During the recess in 1845 the potato rot and famine in Ireland brought the question of the corn laws to a crisis, and Peel declared in favor of their total repeal. By his will he renounced a peerage for his family, as he had before declined the garter for himself.

**Peer**, in general, signifies an equal, one of the same rank and station. In this sense it is used by the common law of England, which declares that every person is to be tried by his peers. Peer also signifies in Britain a member of one of the five degrees of nobility that constitute the *peerage* (duke, marquis, earl, viscount, baron), or more strictly a member of the House of Lords.

**Peffer**, WILLIAM A., U. S. senator, was b. in Cumberland co., Pa., Sept. 10, 1831. An exponent of the ideas advocated by the Farmers' Alliance. He was elected U. S. senator from Kansas for term beginning March 4, 1891.

**Pegu** (pe'gō), now a division of Lower Burmah, but previous to 1757 a powerful and independent kingdom, and from that period up to 1853 a province of the Burmese Empire, from which it was severed and annexed to the British dominions in 1853. The province comprised the whole delta of the Irrawaddy; area 25,964 sq. mi.; pop. 2,323,512. The modern division of Pegu lies mainly on the east of the lower Irrawaddy. Area 9,159 sq. mi.; cultivated area 2,043 sq. mi.; pop. 1,162,393. Chief town, Rangoon.

**Pei-ho** (pe-i-hō'), a river of Northern China, rises near the Great Wall, and flows south-east to the Gulf of Pechellee. It is navigable for boats to within 20 mi. of Peking, which it passes at the distance of about 10 mi. At its mouth is the small town of Taku, with several forts, which acquired some note in the war with the British and French in 1860.

**Peipus** (pe'i-pūs), a lake of Russia, be-

## Peixoto

tween the governments of St. Petersburg, Revel, and Livonia; length 55 mi.; breadth 30 mi. It discharges itself by the Narova into the Gulf of Finland. It is well supplied with fish.

**Peixoto**, FLORIANO (1842-1895), a Brazilian statesman, b. at Alagoas. He served in the Brazilian army in the war with Paraguay from 1865 to 1870. He was made minister of war after the republic was formed in 1890, and elected vice president the following year. He succeeded to the presidency in November, 1891.

**Pekin**, Tazewell co., Ill., on Illinois River, 10 mi. from Peoria. Railroads: P. D. & E.; C. P. & St. L.; Santa Fé. Industries: two iron foundries, flouring mill, extensive distilleries and others. Pop. 1900, 8,420.

**Peking'**, (or Pekin') the capital of the Chinese Empire, in the province of Chih-le or Peche-lee, on an extensive, barren, sandy plain, between the rivers Pei-ho and Hoen-ho, about 40 mi. from the Great Wall, and 100 mi. from the Gulf of Pechelee. The entire circuit of the walls and suburbs of Peking is reckoned at 30 mi. There are in all sixteen gates leading into the city, each protected by a semicircular enceinte, and a higher tower built in galleries. The city consists of two portions, the north or Tartar city, and the south or Chinese city. The former is built in the shape of a parallelogram, and consists of three enclosures, one within the other, each surrounded by its own wall. The innermost enclosure contains the imperial palace, and buildings connected with it, in which the emperor and royal family reside. The second enclosure is the residence of the imperial princes and officials of the highest rank. The outer or Tartar city proper is the seat of the six supreme tribunals, and contains the legations of Great Britain, France, the U. S., and Russia. In the Chinese city broad, straight streets run from gate to gate, intersecting each other at right angles, but they are unpaved, and in rainy weather impassable from mud. Among the principal public buildings of Peking are the Temple of Eternal Peace, belonging to the lamas; the Mohammedan mosque; the observatory; the Temple of Agriculture; and the Temple of Heaven. In the latter temple the emperor periodically offers sacrifice. It is a vast circular building surmounted by a couple of inverted saucer-shaped roofs, one over the other, and the exterior is brilliantly and harmoniously colored. It occupies a commanding position, and is approached from the different sides by magnificent alabaster stairs. There are religious edifices appropriated to many forms of religion, the principle of toleration being here carried to the utmost extremity—among these are the Greek and Latin churches, Moslem mosques, Buddhist temples, besides temples dedicated to Confucius and other deified mortals. Among the institutions of Peking are the national college, the medical college, astronomical board, and the imperial observatory. Peking is sustained solely by its being the seat of government, having no

## Pelican

trade except that which is produced by the wants of its population. Peking is regarded by the Chinese as one of their most ancient cities, but it was not made the capital of the country until its conquest by the Mongols about 1282. In the war of 1860 Peking was occupied by the British and French on October 12, and evacuated by them, after the signing of a convention, on November 5. Pop. variously estimated at from 500,000 to 1,650,000. (For Boxer trouble see *China*.)

**Pela'gius**, the name of two Popes: PELAGIUS I, Pope from 555 to 560, took an active part in the controversy of the *Three Chapters of Justinian*. PELAGIUS II, Pope from 578 to 590, was elected when Rome was besieged by the Lombards. During his entire pontificate he tried in vain to bring an end to these troubles. Just before his death came the welcome news that the West-Goths in Spain had returned from Arianism to the orthodox faith.

**Pelagius**, the author of a heresy known as Pelagianism. He was a monastic of great erudition and eloquence, and wrote fourteen books on St. Paul's Epistles, in which he denied the transmission of original sin. St. Augustine in his *De Gestis Pelagii* attacked Pelagius, whose errors were condemned by the Council of Carthage in 416.

**Pel'amis**, a genus of venomous sea snakes, often found swimming in the ocean at great distances from land. It has a length of 2½ ft., and is black above and yellow beneath.

**Pelas'gians**, a prehistoric race widely spread over the whole of Greece, the coasts and islands of the Ægean, and also in Asia Minor and Italy. Neibuhr regarded them as a great and widely spread people, inhabiting all the countries from the Po to the Bosphorus, and supplying a common foundation to the Greek and Latin peoples and languages. A common view is that they were simply the earliest Hellenic inhabitants of Greece.

**Pelew' Islands**, a group belonging to the Caroline Archipelago, in the North Pacific Ocean. They are about twenty in number, extend nearly n.e. and s.s.w. 87 mi., and are completely encircled by reefs. They are fertile, and enjoy a good climate. The inhabitants are Polynesians, and have generally got a high character from visitors. Pop. 6,000.

**Pel'ican**, the name of several web-footed birds. They are larger than the swan, have a great extent of wing, and are excellent swimmers. Pelicans are gregarious and frequent the neighborhood of rivers, lakes, and the sea coast, feeding chiefly on fish, which they capture with great adroitness. They have a large flattened bill, the upper mandible terminated by a strong hook, which curves over the tip of the lower one; beneath the lower mandible, which is composed of two flexible, bony branches meeting at the tip, a great pouch of naked skin is appended, capable of holding a considerable number of fish, and thus enabling the bird to dispose of the superfluous quantity which may be taken during fishing expeditions, either for its own consumption or for the nourishment of its young. The species

## Pelican Fish

are found in Europe, Asia, Africa, and America. They sometimes perch upon trees; the nest is of rough construction, usually placed close to the water. The common or white pelican is colored a delicate white, tinged with rose or pink. The young birds are fed by the parents with fishes from the pouch, and the males are said to feed the incubating females in a similar manner. The common pelican inhabits Europe, Asia, and Africa. About the middle of September flocks repair to Egypt. During the summer months they take up their abode on the borders of the Black Sea and the shores of



Pelican.

Greece. The pelican is not only susceptible of domestication, but may even be trained to fish for its master.

**Pelican Fish** (*Eurypharynx pelicanoides*), a remarkable deep-sea Teleostean fish, described by Vaillant in 1882. The body is somewhat eel-like, and is fringed on the dorsal and ventral middle line with spinous rays. It is the region of the jaws, however, which is most remarkable, the gape is so enormous. The fish probably engulfs small animals in whale-like fashion, but at the bottom of the sea instead of at the surface. Gill and Ryder discovered a similar form, *Gastrostomus bairdii*, in 1883, in which the mouth again suggests a pelican's pouch. The equally strange Saccopharyngidae are perhaps allied, but the jaws are less enormous, and the animals are notable for swallowing fishes larger than themselves.

**Pella**, the ancient capital of Macedonia, and the birthplace of Alexander the Great. It surrendered to Paulus Æmilius 168 B.C., and from a large and magnificent city it sunk, under the Romans, to a mere station.

**Pel'lico**, SILVIO (1788-1854), Italian poet, b. at Saluzzo, in Piedmont. By his tragedies of *Laodamia* and *Francesca da Rimini* he earned

## Pen

an honorable place among Italian poets. In the same year, with Manzoni and others, he established the periodical *Il Conciliatore*. The Marchioness of Barolo offered him an asylum at Turin, and he became her secretary.

**Pelop'idas**, in ancient Greek history, a Theban general and statesman. The supremacy of the Spartan faction in Thebes forced Pelopidas, with other exiles, to take refuge in Athens, but he returned in B.C. 379, and succeeded in overthrowing the Spartan party and recovering the citadel of Thebes. In the war which followed with Sparta Pelopidas distinguished himself in the battle of Tegyra and of Leuctra by which Thebes became for a time the leading power of Greece. In 364 he was sent against Alexander of Pheræ, tyrant of Thessaly, whom he defeated, though he himself was slain.

**Peloponne'sus**, the peninsula which comprehends the most southern part of Greece, now called the Morea. Peloponnesus was anciently divided into six states: Messenia, Laconia (Sparta), Elis, Arcadia, Achaia, and Argolis, to which some add Sicyon.

**Pe'lops**, in Greek mythology, son of Tantalus, king of Lydia. He married Hippodamia, a daughter of King Œnomaus of Elis, and succeeded his father-in-law in that kingdom. Peloponnesus received its name from him. Of his sons, Atreus and Thyestes are most celebrated. Many and different myths are connected with his name.

**Pelvis** (Latin, *pelvis*, a basin), the bony basin formed by the "haunch bones" and sacrum of vertebrata, which constitutes the girdle or arch giving support to the lower or hinder limbs. The pelvis thus corresponds to the shoulder girdle of the upper or fore limbs; and forms a cavity or basin in which several of the abdominal viscera, and organs relating to reproduction and the urinary functions, are protected and contained. The pelvis consists of four bones, the front and sides being formed by the two *ossa innominata* or innominate bones, and the circle being completed behind by the *sacrum* and the *coccyx*. Each innominate bone consists in early life of three pieces termed *ilium*, *ischium*, and *pubis*, and they meet in front at the *symphysis pubis*. The pelvis of man differs materially from that of woman, the differences having chiefly reference to the greater capacity required for the womb during pregnancy, and for the expulsion of the child at birth. It also varies somewhat in different races of men.

**Pen**, an instrument for writing with a fluid. Pens of some sort have been in use from very early times, adapted to the material on which the characters were to be inscribed. The metallic stilus for the production of incised letters was probably the earliest writing implement. It was used by the Romans for writing on tablets coated with wax; but both they and the Greeks also used what is the true ancient representative of the modern pen, namely, a hollow reed, as is yet common in Eastern countries. It has been asserted that quills were used for writing as early as the fifth cen-



## Penal Servitude

ture A.D. In Europe they were long the only writing implement, the sorts generally used being those of the goose and swan. Up till the end of the first quarter of the present century these formed the principal materials from which pens were made. In 1803 Mr. Wise produced steel pens of a barrel form, mounted in a bone case for carrying in the pocket. They were of indifferent make, and being expensive were very little used. Joseph Gillott commenced the manufacture about 1820, and succeeded in making the pen of thinner and more elastic steel, giving it a higher temper and finish. He was followed into the same field by Mr. Perry and others, and their improvements have so reduced the cost and raised the quality, that a gross of better pens are now sold by the same makers at one sixth of the price of a single pen in 1821. Cast steel of the finest quality is used in the manufacture, and the various operations are performed by cutting, stamping, and embossing apparatus worked mostly by hand-fly presses. Birmingham was the first home and is still the principal center of the steel pen industry. Gold pens tipped with minute particles of iridium are now in somewhat extensive use, and a good one will last for years. Fountain pens and penholders, to carry a considerable supply of ink and to discharge it in an equal manner, were invented by Joseph Bramah.

**Penal Servitude**, a punishment for criminal offenses, ranging from five years up to the life of the convict.

**Penang'** (Pulo-Penang, or Prince of Wales's Island), an island belonging to Great Britain, lying at the north entrance of the Straits of Malacca off the west coast of the Malay Peninsula. Two fifths of Penang is plain, and the rest hills. The climate is healthy. The island produces cocoanuts and arecanuts, nutmegs and cloves, rice, sugar, coffee, and pepper. George Town, or Penang (pop. 44,267), the capital and port of the settlement, is a handsome town, rapidly increasing in size, and has a large commerce. Pop. of Penang, 90,951.

**Pena'tes**, the private or public gods of the Romans. The images of these gods were kept in the penetralia, or central part of every house, each family having its own Penates and the state its public Penates.

**Pencil**, an instrument used for painting, drawing, and writing. The first pencils used by artists were probably pieces of colored earth or chalk cut into a form convenient for holding in the hand. On the introduction of moist colors, however, delicate brushes of fine hairs were used. Pencils of this kind, and of various degrees of fineness, are now almost solely used by painters for laying on their colors; but in China and Japan they are generally employed, instead of pens, for writing. The hairs used for these pencils are obtained from the camel, badger, squirrel, sable, goat, etc. The hairs, being selected, are bound in a little roll by a string tied tightly round their root ends. The roll is then fixed into the end of a quill tube. For larger pencils a socket of tin plate

## Pendulum

is used instead of the quill. Black-lead pencils, for writing or drawing, are made of slips of graphite or plumbago (otherwise known as black-lead), generally cased in cedar wood. The finest qualities of graphite used to be obtained only from the Borrowdale mines in Cumberland. Blocks of graphite, however, are now rarely found of such size and purity that they can be sawn up into the small square slices of ordinary pencil length; but a method has been devised of purifying the inferior varieties, which are ground to a fine powder, levigated or washed until pure, intimately mixed with clay in various proportions, and afterward solidified by pressure. The comparative hardness and blackness of pencils are attained by the degree of heat to which they are subjected and the proportions of graphite and clay in the leads. Nuremberg is the great center of the lead-pencil trade. Colored pencils are prepared from various chalks, such as are used for crayons, instead of the graphite. Pencils for writing on slate are made by cutting slate into small square pieces and rounding them, or into narrow slips and incasing them in wood.

**Pendant**, in architecture, is a hanging ornament used in the vaults and timber roofs of Gothic buildings, more particularly in late Gothic work. In vaulted roofs pendants are of stone, and generally richly carved; in timber roofs they are of wood variously decorated. Fine examples of stone pendants are to be seen in the chapel of Henry VII, at Westminster Abbey.



Pendant.

**Pendulum**, in the widest sense, a heavy body suspended so that it is free to turn or swing upon an axis which does not pass through its center of gravity. Its only position of steady equilibrium is that in which its center of gravity is in the same vertical plane with the axis. If the body is displaced from this position it will tend to return to it, and it will oscillate or swing from one side of that position to the other until its energy is destroyed by friction, and it at length comes to rest. A small, heavy body suspended from a fixed point by a string, and caused to vibrate without much friction, is called a "simple pendulum." When the swings of a simple pendulum are not too great—that is, when they are never more than about  $30^\circ$  on each side of the position of rest—the pendulum is isochronous. The ordinary pendulum is what is properly a "compound pendulum." A compound pendulum, as seen in clocks, is usually a rigid, heavy, pendulous body, varying in size according to the size of the clock, but the "seconds" pendulum may be considered the standard. The pendulum is connected with the clockwork by means of the escapement, and is what renders the going of the clock uniform.

## Penelopē

In a clock it is necessary that the period of vibration of the pendulum should be constant. As all substances expand and contract with heat and cold, the distance from the center of suspension to the center of gravity of a pendulum is continually altering. Pendulums constructed so that increase or diminution of temperature do not affect this ratio are called compensation pendulums. These take particular names, according to their forms and materials, as the *gridiron pendulum*, the *mercurial pendulum*, etc. The former is composed of a number of rods so connected that the expansion or contraction of certain of them is counteracted by that of the others. The *mercurial pendulum* consists of one rod with a vessel containing mercury at the lower end, so adjusted in quantity that whatever alterations take place in the length of the pendulum, the center of oscillation remains the same, the mercury ascending when the rod descends, and *vice versa*.

**Penel' opē**, in Greek mythology, the wife of Odysseus (Ulysses) and mother of Telemachus, who was but an infant when his father sailed against Troy. During the protracted absence of Odysseus, Penelopē was surrounded by a host of suitors, whom she put off on the pretext that before she could make up her mind she must first finish a large robe which she was weaving for her father-in-law Laërtes. To gain time she undid by night the work she had done by day. Her stratagem was at last communicated to the suitors by her servants, and her position became more difficult than before; but fortunately Odysseus returned in time to protect his spouse, and slay the obnoxious wooers who had been living in riot and wasting his property.

**Penguin**, a family of natatorial or swimming birds adapted for living almost entirely in the



King Penguin.

water. They possess only rudimentary wings, destitute of quill feathers, and covered with a scaly integument or skin. Although useless as organs of flight the wings are very effective aids in diving, and on land they may be used after the fashion of fore limbs. The legs are

## Penn

placed at the hinder extremity of the body, and the birds assume an erect attitude when on land. The toes are completely webbed. They inhabit chiefly the high southern latitudes, congregating sometimes in colonies of from 30,000 to 40,000. There are three different types of penguins, represented by the king penguin, the jackass penguin, and the rock hopper. The jackass penguin and the rock hopper are about 2 ft. 3 in. in height, and the king penguin somewhat larger; but a fossil penguin of the upper Eocene stood from 6 to 7 ft. high.

**Peninsular War**, THE, was caused by the intrigues and ambition of Napoleon who proposed the partition of Portugal, and placed his brother Joseph upon the throne of Spain. For a time the whole peninsula was occupied by French troops, but the Spanish and Portuguese peoples rose in defense of their liberties, and waged a fierce guerrilla warfare against the invaders. Of the memorable struggle which ensued the main features were the retreat of Sir John Moore to Coruña, and his glorious death there; the accession of Sir Arthur Wellesley to the supreme command; his formation of the celebrated lines of Torres Vedras, where he held the French armies in check until he had accomplished the complete liberation of Portugal; and his subsequent victorious march through Spain, marked by the great battles of Salamanca (1812) and Vittoria (1813). In the spring of 1814 the tide of war rolled through the passes of the Pyrenees into the south of France, where this great struggle was concluded by the crowning victory of Toulouse.

**Penitentiary**, a prison in which convicted offenders are confined and subjected to a course of discipline and instruction with a view to their reformation. The two systems of penitentiaries in the U. S. are known as the Pa. and N. Y. systems.

**Penn**, WILLIAM (1644-1718), the founder of the state of Pennsylvania, was b. in London. In his fifteenth year he was entered as a gentleman commoner of Christ Church, Oxford, where he imbibed Quaker views, and was expelled from the university. His father sent him on travels in France and Holland, and in 1666 committed to him the management of a considerable estate in Ireland. At Cork he was committed to prison for attending Quaker meetings, and although he was very soon liberated he had to leave Ireland. In 1668 Penn appeared as a preacher and an author, and on account of an essay, entitled *The Sandy Foundation Shaken*, he was imprisoned in the Tower, where he remained seven months. During this time he wrote his most celebrated work, *No Cross, No Crown*, and *Innocency with Her Open Face*. In 1670 the meetings of Dissenters were forbidden, under severe penalties. The Quakers, however, continued to meet as usual, and Penn was once more thrown into prison. As he would not take the oath at his trial he was sent to Newgate for six months. On his release he visited Holland and Germany. In 1677, in company with George Fox and Robert Barclay, the Quaker, he again set sail on a

## Pennatula

religious visit to Holland and Germany. The persecutions of Dissenters continuing to rage, Penn turned his thoughts toward the New World. From his father he had inherited a claim upon the government of \$80,000, and in settlement of this claim the government in 1681 granted him large territories in North America, the present state of Pennsylvania, with right to found a colony or society with such laws and institutions as expressed his views and principles. The following year Penn came over to America and laid the foundations of his colony on a democratical basis, and with a greater degree of religious liberty than had at that time been allowed in the world. A great number of settlers, not only Quakers, but members of all denominations, Englishmen, Germans, Swedes, gathered together; the city of Philadelphia was laid out upon the banks of the Delaware, and the colony soon came into a most flourishing condition. He remained in the province about two years, adjusting its concerns, and establishing a friendly intercourse with his colonial neighbors. At the Revolution of 1688 Penn's intimacy with the abdicated monarch created suspicions, in consequence of which he was accused of treason, and withdrew from public notice till 1693. In 1699 he again sailed for Pennsylvania, intending to make it the place of his future residence; but he returned to England again in 1701. He d. at Ruscombe, Berks.

**Pennat'ula**, a genus of Cœlenterate animals, class Actinozoa, order Alcyonaria. The sea-pens consist each of a compound organism, which may be described as consisting of a main stem or *cœnosarc*, with lateral pinnæ or branches. These branches are crowded on their upper margins with the little polyps or individual animals that make up the compound mass, and which are connected together through the fleshy medium or *cœnosarc*. The lower end of the stem is fleshy, destitute of polyps, and contains an internal coral rod. By this fleshy root the sea-pens attach themselves loosely to the mud of the sea bed.

**Pennsylvania** (pen'sil-va'ni-a), the *Keystone State*, a Middle Atlantic state, one of the original thirteen, is bounded on the n. by Lake Erie and New York state; on the e. by New York and New Jersey; on the s. by Delaware, Maryland and West Virginia; on the w. by West Virginia and Ohio. Its form is very regular; it is 302.34 m. in length from e. to w., and 175.6 m. broad; its gross area is 45,215 sq. m. The population in 1900 was 6,302,115, of which 160,451 were colored.

**Surface.**—According to its physical features, Pennsylvania may be divided into three parts, a northern and western upland, an open district in the s. e. near the Bay, and a middle belt of parallel valleys and low parallel mountain ranges extending from s.w. to n.e. The mountains are a part of the Appalachian system; the principal ranges are the Laurel Hills, the Alleghany Mts., the Sidling Hills, the Tuscarora Mts., the Blue Mountains and South Mountain. The breadth of the entire mountain system exceeds 200 m.; the maximum

## Pennsylvania

height is 2,500 ft. The principal rivers are, the Delaware on the e. boundary; the Lehigh and Schuylkill, its branches; the Susquehanna, which, with its n.e. and w. branches and the Juniata, drains about 22,000 sq. m.; and the Alleghany and Monongahela forming the Ohio at Pittsburg.

**Climate.**—The climate of the state is different in the three natural divisions. In the n.w. and w. heat and cold are excessive and changes are abrupt. In the n. and mountain regions the winters are severe and the summers delightfully cool. The climate of the eastern section is marked by irregular alternations of the seasons. But the climate is, in general, healthful. The mean temperature at Philadelphia is 54°. The average annual rainfall ranges from 36 in. in the western counties to 42 in. at Philadelphia. Heavy snows fall on the mountains in winter, and the rivers of the western half of the state are often flooded in the spring.

**Mining.**—The coal regions of Pennsylvania are the richest in the world. The anthracite mines are divided into seven districts—Pittston, Wilkesbarre, Hazleton, Shenandoah, Ashland, Pottsville and Scranton. The bituminous districts are Monongahela City, Irwin, Mercer, Towanda, Connellsville, Johnstown, Idlewood and Phillipsburg. Sandstone, iron ore, limestone and fire-clay interstratify with the coal. Gneiss abounds in the s.e. Near Philadelphia are marble quarries, at Phoenixville lead and copper mines, in Lancaster co. nickel; in several counties magnetic iron ore. A part of the Appalachian oil field is in Pennsylvania. Of the annual shipment, 33,000,000 barrels, Pennsylvania produces half. Salt springs are abundant in the state, many of whom being still undeveloped.

**Agriculture.**—Agriculture is one of the leading occupations. In the production of rye, Pennsylvania ranks first in the Union. Great crops of corn, oats, wheat, buckwheat, potatoes and hay are produced. The state ranks sixth in the production of tobacco. Chester co. is famous for its nurseries. The mountain regions and the western plateau are well suited for grazing. One of the best sheepraising districts in the country extends across this state and into Ohio. The dairy products of the state have an immense value.

**Manufactures.**—Next to mining, manufacturing is the chief industry of Pennsylvania. The state ranks second in the Union in the value of its manufactures, which are chiefly of iron and steel. In iron products, Pennsylvania yields as much as all the other states combined. The first blast furnace was opened by Wm. Penn in 1688. The manufacture of Bessemer steel was begun in 1867. The state now ranks first in the production of pig iron (6,371,688 gross tons) and in Bessemer steel (3,488,569 gross tons). The manufacture of textiles ranks second among the industries of the state, Philadelphia being the greatest textile center in the country. The industry third in rank is the manufacture of foundry and machine shop products. The state ranks first



## Pennsylvania

in the Union in the refining of petroleum, and in the manufacture of steam locomotives, of coke and of glass products. For 104 years, Pennsylvania has stood at the head of glass-making states. More ingrain carpets are made in Philadelphia than in any other city. Other important industries are leather tanning, car-building, tin plate manufacture, flouring and grist mills, lumber mills, planing mills, printing and publishing, tobacco factories, manufacture of malt liquors, and of men's and women's clothing. An industry of growing importance, and one in which the state ranked first in 1900, is iron and steel ship-building. The fisheries of the state are of great importance.

**Transportation.**—Early in the history of Pennsylvania the citizens learned that transportation was essential in building up commerce and began the construction of highways. The location itself on the Atlantic coast in communication with the navigable waters of the Ohio-Mississippi Valley and, through Lake Erie, with the great Lake system, proved a great stimulus to manufacturing. Between 1826 and 1839, communication in the interior of the state was improved by the construction of a network of canals. After the building of railroads, many of these were abandoned. The state now ranks second in the United States in railroad mileage, operating 10,181 m. of road. Some of the principal roads are: The Pennsylvania, B. & O., N. Y. C. & Hudson River, the Erie, L. S. & M. S., P. C. C. and St. L. and Lehigh Valley.

**Education.**—The Pennsylvania Germans were the most learned settlers that came to America. As early as 1686, a printing press was established in Philadelphia; in 1690, a paper mill was built; in 1741, Franklin printed books and magazines in Philadelphia; in 1743, Dr. Sauer printed a German bible at Germantown; in 1784, the first daily newspaper was founded in Philadelphia. Schools formed a part of the original scheme of government prepared by Penn. About 1718, Christopher Dock opened a school in Montgomery co. In 1726, the famous Log College was founded on the Neshaminy by Scotch Presbyterians. From this grew Dickinson College at Carlisle, Pa., and Princeton University, N. J. There are now in Pennsylvania an excellent system of public schools, several good normal schools, numerous business and professional schools, and over 30 universities and colleges. The University of Pennsylvania is at Philadelphia, the Western University of Pennsylvania at Alleghany and Pittsburg. Bryn Mawr (for women) at Bryn Mawr, Dickinson College at Carlisle, Lafayette College at Easton, Lehigh University at South Bethlehem, and the Drexel Institute of Art, Science and Industry at Philadelphia.

**History.**—In 1609, Henry Hudson discovered Delaware Bay. The first permanent settlement in the state was made in 1643 by Swedes at the present site of Chester; in 1655, the Dutch took the colony; in 1664, the English obtained possession; in 1681, the territory was

## Pensions

granted by Charles II to Wm. Penn. In 1682, Penn came to America and made his famous treaty with the Indians, which was never broken. Penn, though an Englishman, had preached in Holland and Germany, and many friends whom he had won there flocked to the new country to escape persecution. The colony flourished. In 1755–1763, troubles with Indians on the frontier occurred, and in 1778 was the awful massacre of Wyoming. The First Continental Congress met in Philadelphia in 1774. Pennsylvania was active in all the momentous events of the Revolution. Independence was proclaimed on her soil, 1776; the battle of Germantown took place, 1777; Washington went to Valley Forge in December of the same year. During the Civil War several invasions were made by the Confederates into Pennsylvania: Gen. Stuart's raid, 1862; Lee's invasion, which culminated in the battle of Gettysburg, July 1–3, 1863; and Early's raid and the burning of Chambersburg, 1864. The principal cities of Pennsylvania, with population in 1900, are: Harrisburg, the capital, 50,167; Philadelphia, the third largest city in the U. S., 1,293,697; Pittsburg, 321,616; Alleghany, 129,896; Scranton, 102,026; Reading, 78,961.

**Pennsylvania, UNIVERSITY OF**, an institution of higher learning in Philadelphia, Pa., established in 1740 as a charitable school. In 1751 it was raised to the grade of an academy, in 1755 was converted into the College and Academy of Philadelphia, and in 1791 an act was passed making the institution a university with its present title. The university comprises the following departments: the college, including the art school, the courses for teachers and the Towne Scientific School; the departments of Philosophy (Graduate School), Law, Medicine, Dentistry, Veterinary Medicine and Archaeology; the Wistar Institute of Anatomy and Biology; Physical Education, and the Flower Astronomical Observatory. There is a provision for a large number of scholarships and 29 fellowships, with incomes ranging from \$200 to \$800. The medical school has achieved an international reputation, while the dental school is also widely known. In 1904 the university had 290 instructors, 2,550 students and a library containing 225,525 volumes. The president is Charles Custis Harrison.

**Penob'scot**, the largest river of Maine, U. S. of America. It flows 300 mi. s. by w. to Penobscot Bay. It is navigable for ships to Bangor, 60 mi., where the tide rises 17 ft.

**Pensacola**, Escambia co., Fla., on Pensacola Bay, 50 mi. s. e. of Mobile. Railroads: Louisville & Nashville; Alabama, Pensacola & Perdido. It is a port of entry; exports include fish, lumber, hides, tallow, wool, cotton and naval stores. The Pensacola navy yards are located at Warrington, 7 mi. seaward. Pop. 1900, 17,747.

**Pensions**, annual allowances of money settled upon persons, usually for services previously rendered. The pension system of the U. S. presents two peculiar features, in the al-

## Pensions

most entire absence of a civil list, and the non-recognition of long service as a ground for pension. Generally speaking, pensions are granted only for the active service in time of war, and therefore the beneficiaries are the survivors (or their widows and children) of the armies of volunteers and conscripts who took part in the country's several wars. On June 30, 1903, the list of pensioners, besides those arising out of the Civil War, was as follows: Revolution, widows 2, daughters 3; War of 1812, survivor 1, widows 1,115; Indian wars, survivors 1,565, widows 3,169; Mexican, survivors 5,964, widows 7,910; Spanish, survivors 9,200, widows 3,662. But the bulk of the U.S. pensions are "invalid pensions," for total or partial disability from wounds or other disease contracted during the Civil War. The widows and minor children under sixteen years of age of those who have died from such wounds or disease; or, in the event of no such widows or minor children surviving, then the dependent mothers, fathers, or minor brothers and sisters of officers or men so dying. The pensions, which range from \$24 to \$2,000 per annum, are graded, and many specific wounds and disabilities are scheduled and priced. Thus, where the regular aid and attendance of others is required, from \$50 to \$72 a month is paid; where the beneficiary is incapacitated for manual labor, \$30 a month; for the loss of a hand or foot, or total deafness, \$30, but of both feet or hands, or both eyes, \$72 a month; and for amputation at the shoulder or hip joint, \$45. Widows of privates receive \$12 a month; dependent relatives the same; children \$2 each, but if the widow does not survive they receive their pension jointly. Widows or dependent relatives of officers receive from \$15 to \$30 a month. The pension of widows ceases when they marry. For the administration of the pension system an independent bureau was created in 1833; since 1849 it has been a bureau of the department of the interior. Under the commissioner, who is appointed by the president, there are nearly 2,000 persons employed in the settlement of claims for pensions; and besides there are nearly 3,000 surgeons throughout the country engaged to examine applicants. The following figures show plainly enough the enormous growth of the American pension system. In 1862 the disbursements slightly exceeded \$790,000, in 1872 they exceeded \$30,000,000, in 1882 \$54,000,000; while in the year ending June 30, 1888, they were over \$82,000,000, in the next year over \$87,000,000, and in the year ending June 30, 1890, \$109,357,534. Moreover, in June, 1890, a dependent pension law was passed. In 1890 the pensions swallowed up more than one fourth of the entire revenue of the republic. There were 996,545 pensioners on the rolls in June, 1903. The number of pensioners under the law of 1890, upon the rolls in June, 1903, was 605,962. The total number of applications filed since 1861 is 2,924,701, of which 1,782,213 have been granted. The total cost of the pension bureau since its organization has been \$3,037,826,081. The cost of administration during the year 1902-

## Peony

1903, \$3,993,216, and the total disbursements, \$138,890,088. The cost per capita of the population in 1903 was about \$1.75. On April 13, 1904, by an executive order all veterans 62 years old are to receive \$6 per month; at 65, this is to be increased to \$8 per month; at 68 to \$10; at 70 to \$12 per month. This adds an annual expenditure of about \$60,000,000. It may be added that by act of 1882 children of keepers or crew of a life-saving or life-boat station who perish in or from injuries received through the life-saving service are given the full pay of the deceased for two years.

**Pen'tecost**, a Jewish festival, held on the fiftieth day after the Passover, in celebration of the ingathering and in thanksgiving for the harvest. It was also called the *Feast of Weeks*, because it was celebrated seven weeks after the Passover. It is also a festival of the Christian church, occurring fifty days after Easter, in commemoration of the descent of the Holy Ghost on the disciples, called in England *Whitsuntide*.

**Penumbra**, the partial shadow between the full light and the total shadow caused by an opaque body intercepting the light from a luminous body, the penumbra being the result of rays emitted by part of the luminous body. An eye placed in the penumbra would see part of the luminous body, part being eclipsed by the opaque body; an eye placed in the "umbra," or place of total shadow, would receive no rays from the luminous body; an eye placed anywhere else than in the penumbra and umbra sees the luminous body without eclipse. The subject is of importance in the consideration of eclipses. In a partial eclipse of the sun, as long as any part of the same is visible the parties observing are in the *penumbra*; when the eclipse is total, in the *umbra*.

**Penza**, a government of Russia, bounded by Nijni-Novgorod, Tambov, Saratov, and Simbirsk; area 14,996 sq. mi.; pop. 1,356,600. Its surface, though generally flat, is intersected by some low hills separating the basins of the Don and Volga. About 60 per cent. of the soil is arable, the chief crops being rye, oats, buckwheat, hemp, potatoes, and beet root, and about 14 per cent. is under meadows or grazing land. The forests are extensive. The chief exports are corn, spirits, timber, metals, and oils. Penza, the capital, is on an eminence at the junction of the Penza and Sura, 440 mi. s.e. of Moscow. It was founded in 1666 as a defense against Tartar incursions, is mostly built of wood, has a cathedral, several other churches, a theater, etc. Pop. 41,650.

**Pe'ony** (*Paeonia*), a genus of plants belonging to the natural order Ranunculaceae, and very generally cultivated in gardens for the sake of their large showy flowers. The species are mostly herbaceous, having perennial tuberous roots and large, deeply lobed leaves. The flowers are solitary, and of a variety of colors, crimson, purplish, pink, yellow, and white. The flowers, however, have no smell, or not an agreeable one, except in the case of a shrubby species, *P. Moutan*, a native of China, of which several varieties, with beautiful whitish flowers

## Peoria

stained with pink, are cultivated in gardens. The roots and seeds of all the species are emetic and cathartic in moderate doses. *P.*



Peony.

*officinalis* or *festiva*, the common peony of cottage gardens, was formerly in great repute as a medicine.

**Peoria**, co. seat Peoria co., Ill.; on the Illinois river, 160 m. s. w. of Chicago. Railroads: there are eleven main lines, among which are the Burlington Route, C. R. I. & P.; Illinois Central and Vandalia Line. The city is in a corn and coal region, is noted for its manufacture of spirits and is the eighth grain market in the U. S. It has an extensive commerce by rail and water with Chicago, St. Louis and other cities. It manufactures, agricultural implements, malt liquors and foundry and machine-shop products. Pop. 1900, 56,100.

**Pepin**, the name of two distinguished Frank rulers of the eighth century, under the last kings of the Merovingian dynasty. 1. **PERIN OF HERISTAL**, major-domo at the court of Dagobert II, was, after the death of the king, appointed duke of the Franks, and under a feeble regency ruled the kingdom with almost despotic sway. Charles Martel was his natural son. 2. **PEPIN LE BREF**, son of Charles Martel, was, by agreement with the pope, proclaimed king of the Franks in 752, after the deposition of Childeric III.

**Pepper**, a genus of plants which furnishes the black pepper of commerce, is a native of the East Indies, where it is cultivated on an extensive scale. It is a climbing plant with broad, ovate, acuminate leaves, and little globular berries, which, when ripe, are of a bright red color. The pepper of Malacca, Java, and especially of Sumatra, is the most esteemed. Its culture has been introduced into various other tropical countries. White pepper is the best and soundest of the berries, gathered when fully ripe, and deprived of their external skin.

**Pepsin**, a popular organic compound, which in the proportion of 0.78 to 100 parts, accord-

## Peptones

ing to Schmidt, enters into the composition of the gastric juice. The nature of pepsin is little known. It is certain that it is in the nature of a ferment, and that it differs from *ptyalin*, the ferment of saliva, by its being active in a definitely acid medium, while *ptyalin* acts more freely in one faintly alkaline. Besides, pepsin is intimately connected with the acidity of its medium. Pepsin converts proteids into peptones (which *ptyalin* does not), and herein resembles the *trypsin* of the pancreas, which, however, acts in an alkaline medium, and the special ferment of the intestinal juice.

Pepsin can be isolated by digesting portions of the mucous membrane of a stomach in cold water, after maceration in warm water (about 90°). The cold water takes up little else than pepsin, which on evaporation it throws down as a grayish-brown viscid fluid. The addition of alcohol precipitates the pepsin in a grayish-white flocculi. The stomach secretes pepsin and hydrochloric acid, and the very vigorous action of the stomach depends upon the union of the two, converting the food into chyme, a pultaceous, grumous, semifluid mass, with a strong disagreeable acid odor and taste. See *Chyme*, *Peptones*.

As employed in medicine for digestive purposes, it is usually obtained from the stomach of the pig or calf by drying the fresh mucous lining of the stomach at a temperature below 100° F. It then forms a light yellowish-brown powder. It is only active in a dilute acid solution, 2 gr. in an ounce of distilled water, to which 5 drops of hydrochloric acid have been added, for a mixture in which 100 gr. of hard-boiled white of egg will digest or dissolve in about four hours at a temperature of 98° F. That prepared from the stomach of the pig, and known in medicine as *pepsina porci*, is preferred.

**Pep'tones** are a class of proteid substances, produced during digestion by the action on



Black Pepper.

the pepsin ferment of the gastric juice upon the nitrogenous elements of the masticated food in the stomach. The production of peptones is the main function of the digestion of



## Perception

the stomach. Artificially albumen peptone may be produced by diluting white of an egg, and adding to it gastric juice or pepsin obtained in the usual manner, when it will be found after the mixture has been kept a short time at about 100° F., that the albumen will no longer coagulate on boiling; and if the solution be neutralized with an alkali, a precipitate of acid albumen is thrown down. If the neutralization be several times repeated till all the acid albumen is extracted there remains a considerable quantity of albumen in solution in the form of a peptone.

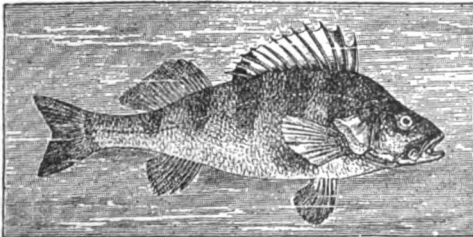
The main features of peptones, distinctive from other proteids, are 1, their ready diffusibility; 2, their stability as against precipitation by heat and many acids, etc., though they are thrown down easily by tannic acid and by perchloride of mercury; 3, their solubility in water and in neutral saline solutions.

It is evident that these present a remarkable series of differences in favor of digestibility. White of egg, for instance, being a colloid, is difficult of transmission through a membrane, and of course is quite insoluble when boiled, but it becomes akin to crystalloids as soon as it is acted on by the gastric juice, is easily soluble, and passes in solution through the membranous lining of the stomach into the system of surrounding blood vessels. The precipitated portion of the contents of the stomach (answering to the acid albumen in the above experiment) are usually called *parapeptones*. It is hardly necessary to observe that as there are many sorts of proteids so are there many varieties of peptones. At present the reason of peptonic change is little known, beyond that it is of a fermentative character.

**Perception.** See *Psychology*.

**Per'ceval**, SPENCER (1762-1812), English statesman. On quitting Cambridge University he studied law. In 1801 he became solicitor general, and in 1802 attorney general. In 1807 he was appointed chancellor of the exchequer, and on the death of the Duke of Portland, in 1809, he became premier. In this post he continued till a person named Bellingham shot him dead with a pistol in the lobby of the House of Commons.

**Perch**, a genus of acanthopterous fishes, forming the type of the perch family. The



Perch.

common perch is a common tenant of fresh water lakes and rivers. The body is broad, and somewhat flattened laterally. There are two dorsal fins, the anterior supported by very

## Perfumes

strong spines. It is colored a greenish-brown on the upper parts, the belly being of a yellowish or golden white. The sides are marked with from five to seven blackish bands. The average weight is from 2 to 3 lbs. The perch is a voracious feeder, devouring smaller fishes, worms, etc. The American yellow perch is one of the most common and beautiful of the fresh-water fishes of the U. S.

**Perennial**, in botany, a term applied to those plants whose roots subsist for a number of years, whether they retain their leaves in winter or not. Those which retain their leaves are called *evergreens*, such as cast their leaves are called *deciduous*. Perennial herbaceous plants, like trees and shrubs, produce flowers and fruit year after year.

**Perfectionists** (or Bible Communists, popularly named Free-lovers), an American sect founded in 1838 by John Humphrey Noyes. Noyes was employed as a law clerk at Putney, in Vermont, when the fierce religious revival of 1831 spread over the New England states, but he abandoned law for religion, and took upon himself the restoration of the primitive Christian ideal.

**Perfumes**, substances emitting an agreeable odor, and used about the person, the dress, or the dwelling. Perfumes of various sorts have been held in high estimation from the most ancient times. The Egyptians, Hebrews, Phoenicians, Assyrians, and Persians are known to have made great use of them, as did also the Greeks and Romans. In the Middle Ages France and Italy were most conspicuous for the use and preparation of perfumes. Perfumes are partly of animal but chiefly of vegetable origin. They may be divided into two classes, crude and prepared. The former consist of such animal perfumes as musk, civet, ambergris, and such vegetable perfumes as are obtained in the form of essential oils. The prepared perfumes, many of them known by fancy names, consist of various mixtures or preparations of odorous substances made up according to recipe. At the present time the manufacture of perfumes is chiefly carried on in Paris and London, and in various towns near the Mediterranean, especially in the south of France. Certain districts are famous for certain productions; as Cannes for its perfumes of the rose, tuberose, cassia, jasmine; Nîmes for thyme, rosemary, and lavender; Nice for the violet and mignonette. England claims the superiority for her lavender, which is cultivated upon a large scale at Mitcham in Surrey. The most expensive perfume in the market at present is the oil of rose petals, or otto of roses, \$600 per lb. In making perfume the blossoms are taken from a bushy variety of the damask rose, and from the white musk rose. These roses are gathered in the latter part of May, and, as soon as picked, are taken to the distillery and placed in large, cool cellars. The stills are made of tinned copper with a miniature furnace underneath. About 25 lbs. of fragrant blossoms are put into each of them, water is added, and the fires started. When about one fifth of the contents has been

## Pergunnahs

drawn over through a water-cooled worm, the still is emptied and recharged and the process is repeated until all the harvest of roses has been used up. The first product is simply rose water. This rose water is returned to the still and about one third of its bulk of second rose water is drawn over. Throughout this liquid there are scattered little globules of a precious oily attar very sweet to smell. The distillate is now put into bottles, and the oil gradually comes to the top and is dipped out with a spoon. This attar is worth about \$6 an oz. Nearly all the ordinary perfumes are made by a process known as *enfleurage*. This consists in placing freshly gathered flowers in a glass case, the lid of which has been daubed with lard to the depth of half an inch. In the course of a day the lard absorbs all the essential oils in the flowers and they are replaced by fresh ones. When fully charged the lard is scraped off, melted and combined with alcohol, which brings the volatile oil to the surface. It is then skimmed off and filtered, and is ready to be bottled and shipped. The waste leaves from the process are used as fertilizers.

**Pergunnahs** (Parganás), THE TWENTY-FOUR, a district in India, forming the metropolitan district of the lieutenant governorship of Bengal; area 2,128 sq. mi. They form a great alluvial plain, part of the delta of the Ganges, intersected by innumerable river channels, creeks, and canals. Pop. (exclusive of Calcutta) 1,618,420.

**Per'icles** (-klēz) (494-429 B.C.), one of the most celebrated statesmen of ancient Greece, b. at Athens. He was connected by family relations with the aristocracy, but as Cimon was already at its head he endeavored to gain the favor of the popular party. In this he fully succeeded by his eloquence, abilities, and political tactics, so that on the death of Cimon, in 449 B.C., Pericles became virtual ruler of Athens. By his great public works he flattered the vanity of the Athenians, while he beautified the city and employed many laborers and artists. His chief aim was to make Athens undoubtedly the first power in Greece, as well as the chief center of art and literature, and this position she attained and held for a number of years. At the commencement of the Peloponnesian War (B.C. 431), in which Athens had to contend against Sparta and other states, Pericles was made commander in chief. The Spartans advanced into Attica, but Pericles had made the rural population take refuge in Athens and refused battle. After they retired he led an army into Megaris, and next year he commanded a powerful fleet sent against the Peloponnesus. In 430 B.C. a plague broke out at Athens, and for a brief period Pericles lost his popularity and was deprived of the command. The people, however, soon recalled him to the head of the state, but amid his numerous civil cares he was afflicted by domestic calamities. Many of his friends, and his two sons, Xanthippus and Paralus, were carried off by the plague; and to console him for this loss the Athenians allowed him to legitimize his son by Aspasia. Pericles was distinguished by intel-

## Peripatetic Philosophy

lectual breadth, elevated moral tone, unruffled serenity, and superiority to the prejudices of his age. His name is intimately connected with the highest glory of art, science, and power in Athens.

**Périer** (pā-ri-ā), CASIMIR (1777-1832), French statesman, was b. at Grenoble. In 1802 he established a prosperous banking house in company with his brother. In 1817 he was elected to represent the department of the Seine in the Chamber of Deputies. Here he became one of the leaders of the Opposition under Charles X, and was no less distinguished as the firm and eloquent advocate of constitutional principles than as an enlightened and sagacious financier. After the revolution of 1830 he was prime minister to Louis Philippe.

**Perim**, an island in the Strait of Bab-el-Mandeb, at the entrance to the Red Sea, about 10 mi. from the Abyssinian and 1½ mi. from the Arabian shore. It has been held by Great Britain since 1857, and is under the government of Aden. It is of consequence from its commanding position, which renders it the key of the Red Sea. On its southwest side is a well-sheltered harbor capable of containing a fleet of warships. Area 7 sq. mi.; pop. (including garrison) 150.

**Periodicals**, publications which appear at regular intervals, and whose principal object is not the conveyance of news (the main function of newspapers), but the circulation of information of a literary, scientific, artistic, or miscellaneous character, as also criticisms on books, essays, poems, tales, etc. Periodicals exclusively devoted to criticism are generally called *reviews*, and those whose contents are of a miscellaneous and entertaining kind *magazines*; but there is no great strictness in the use of the terms. The first periodical was published in France, being a scientific magazine, the *Journal des Savants*, issued in 1665, and still existing in name at least. The most famous French literary periodical is the *Revue de Deux Mondes*, begun in 1829, from 1831 issued fortnightly, and marked by an ability which has placed it in the front rank of the world's periodicals. Into it tales, poems, etc., are admitted, and the names of the contributors have to be attached to their articles. The earliest English periodical seems to have been the *Weekly Memorials for the Ingenious*, the first number of which is dated January, 1681-82, and which lasted but a year. It was followed by several other periodicals, which for the most part had but a brief existence. In the last century a number of monthly reviews appeared, including the *Monthly Review* (1749-1844); the *Critical Review* (1756-1817); the *British Critic* (1793-1843); the *Anti-Jacobin Review and Magazine* (1798-1821). The most popular American reviews and magazines of our times are *Munsey's Magazine*, the *North American Review* (1815), now monthly, *Harper's Monthly Magazine*, the *Atlantic Monthly*, *Lippincott's Magazine*, *Scribner's Magazine*, *Century Magazine*, *The Cosmopolitan*, *Belford's Magazine*, *Popular Science Monthly*, *Catholic World*, *Forum*.

**Peripatetic Philosophy**, the philosophy of

## Peripatetic Philosophy

Aristotle and his followers, so called, it is believed, because he was accustomed to walk up and down with his more intimate disciples, while he expounded to them his doctrines. The philosophy of Aristotle starts from his criticism of the Platonic doctrine of ideas, in combating which he is led to the fundamental antithesis of his philosophy, that between matter and form. The notion or idea of a thing is not, he says, a separate existence different from the thing itself, but is related to the thing only as form to matter. Every sensible thing is a compound of matter and form, the matter being the substance of which the thing consists, while the form is that which makes it a particular thing (a stone, for example, and not a tree), and therefore the same as its notion or idea. The form is the true nature of a thing. Origination is merely matter acquiring form, it is merely a transition from potential to actual existence. Everything that actually exists previously existed potentially in the matter of which it is composed. Matter is thus related to form as potentiality to actuality. And as there is, on the one hand, formless matter, which is mere potentiality without actuality, so, on the other hand, there is pure form which is pure actuality without potentiality. This pure form is the eternal Being, styled by Aristotle the first or prime mover. The whole of nature forms a scale rising from the lower to the higher of these extremes, from pure matter to pure form, and the whole movement of nature is an endeavor (incapable of realization) of all matter to become pure form. Motion is the transition from the potential to the actual. Space is the possibility of motion. Time is the measure of motion. According to his physical conception the universe is a vast sphere in constant motion, in the center of which is our earth. On this earth, as in all nature, there is a regular scale of beings, the highest of which is man, who, to nutrition, sensation, and locomotion, adds reason. The soul, which is merely the animating principle of the body and stands to the body in the relation of form to matter, cannot be thought of as separated from the body; but the reason is something higher than that, and as a pure intellectual principle exists apart from the body, and does not share in its mortality. Practical philosophy is divided by Aristotle into ethics, economics, and politics. According to his ethical system the highest good is happiness, which depends on the rational or virtuous activity of the soul throughout life. Virtue is proficiency in willing what is conformed to reason. All virtues are either ethical or dianoetic. The former include justice or righteousness, generosity, temperance, bravery, the first being the highest. The dianoetic virtues are reason, science, art, and practical intelligence. For the attainment of the practical ends of life it is necessary for a man to live in society and form a state.

The school of Aristotle (the Peripatetic school) continued at Athens uninterruptedly till the time of Augustus. Those who proceeded from it during the first two or three

## Pernambuco

centuries after his death abandoned, for the most part, the metaphysical side of Aristotle's teaching, and developed chiefly his ethical doctrines, or devoted themselves to the study of natural history. Later Peripatetics again returned to the metaphysical speculations of their master, and many of them distinguished themselves as commentators on his works. No one of the philosophical schools of antiquity maintained its influence so long as the Peripatetic. The philosophy of the Arabians was almost exclusively Aristotelianism, that of the schoolmen (scholasticism) was also based on it, and even down to modern times its principles serve as the rule in philosophical inquiries.

**Per'istyle**, in architecture, a range of columns surrounding the exterior or interior of anything, as the cella of a temple. It is frequently but incorrectly limited in signification to a range of columns round the interior of a place, as an open court.

**Peritone'um**, the serous membrane lining the abdominal cavity and covering the intestines. Like all other serous membranes, the peritoneum presents the structure of a closed sac; one layer (*parietal*) lining the abdominal walls, the other or *visceral* layer being reflected over the organs of the abdomen. A cavity — the *peritoneal cavity* — is thus enclosed between the two layers of the membrane, and this contains in health a quantity of serous fluid just sufficient to moisten its surfaces.

**Perjury**, the act or crime of willfully making a false oath in judicial proceedings in a matter material to the issue or cause in question. Perjury is a misdemeanor punishable at common law, by fine or imprisonment. Particularly, the mere act of making a false oath, or of violating an oath, provided it be lawful, is considered perjury.

**Pernambu'co**, a town in Brazil, capital of the province of the same name, on the east coast. It consists of three distinct parts: Recife, occupying a small peninsula; San Antonio, on an island; and Boa Vista, on the mainland, the three parts being connected by iron bridges. Recife is the principal seat of business. In it are the customhouse, the exchange, a marine arsenal, etc. San Antonio has broad streets and many fine houses, and contains the episcopal palace, the theater, the military arsenals, etc. Boa Vista is the fashionable residential quarter. The harbor is formed by the reef, which encloses a belt of water about a mile in breadth. The trade is extensive. The principal exports are sugar and cotton; and the chief imports Manchester goods and hardware. Pernambuco was founded by the Portuguese in the sixteenth century. From 1630 to 1654 it was in the hands of the Dutch, under whom it prospered greatly. It is now the third largest city in Brazil, and the second in point of commercial importance. Pop. 130,000. The province has an area of 49,625 sq. mi. The principal cultivated crops are the sugar cane and cotton. It is chiefly the coast districts that are cultivated. The interior is either pasture land or covered with forests yielding valuable timber, including



## Perpetual Motion

Brazil wood, often called Pernambuco wood. Pop. 1,110,831.

**Perpetual Motion**, motion that, once originated, continues forever or indefinitely. The problem of a perpetual motion consists in the invention of a machine which shall have the principles of its motion within itself, and numberless schemes have been proposed for its solution. It was not till the discovery of the conservation of energy, experimentally proved by Joule, that the impossibility of the existence of a perpetual motion was considered to be a physical axiom. This principle asserts that the whole amount of energy in the universe, or in any limited system which does not receive energy from without, or part with it to external matter is invariable. But every machine when in action does a certain amount of work, if only in overcoming friction and the resistance of the air, and as the perpetual motion machine can start with only a certain amount of energy, this is gradually used up in the work it does. A machine, in short, would be required in which there was no friction, and which met with no resistance of any kind. The mechanical arrangements which have been put forward as perpetual motions by inventors are either, 1, systems of weights, which are allowed to slide on a wheel into such positions relatively to the axis of the wheel as to produce a constant turning movement in one direction; 2, masses of liquid moving in wheels on the same principle; 3, masses of iron arranged on the same principle, but subjected to the attractions of magnets instead of their own weights. Numbers of patents for such machines are constantly being applied for, but as perpetual motion is regarded as utterly impracticable no patents are granted for such claims.

**Perpignan** (per-pēn-yān), a city of Southern France, capital of dep. Pyrénées-Orientales, on the Têt, about 7 mi. from the Mediterranean. Guarding the entrance from Spain into France by the East Pyrenees, it is strongly fortified, has a citadel and other works, and ranks as a fortress of the first class. The principal building is the cathedral. Perpignan was formerly the capital of the county of Roussillon, was long under Spanish rule, and was not united to France till the Treaty of the Pyrenees in 1659. Pop. 29,876.

**Perry**, OLIVER HAZARD (1785-1819), an American naval officer, b. at South Kingston, R. I., is famous for his defeat of a British force on Lake Erie in 1813. Perry, who had nine vessels, with 54 guns and 492 officers and men, fought six vessels, with 63 guns and 502 officers and men, lost four fifths of the crew of his flagship, and finally won a complete victory, which he announced in the brief dispatch: "We have met the enemy, and they are ours—two ships, two brigs, one schooner, and one sloop." Perry d. of yellow fever at Trinidad, and was buried at Newport, R. I., where there is a bronze statue (1885).

**Persecutions**, the name usually applied to periods during which the early Christians were subjected to cruel treatment on account of

## Persepolis

their religion. Ten of these are usually counted. The *first persecution* (64-68) was carried on under Nero. The cruelties practised on this occasion are worthy of the ferocious instincts of that notorious tyrant. The apostles Peter and Paul suffered in this persecution. The *second persecution* (95-96) was raised by the Emperor Domitian. Many eminent Christians suffered; and it is generally held that St. John was exiled to Patmos at this time. The *third persecution* began in the third year of Trajan (100). This persecution continued for several years, with different degrees of severity in many parts of the empire, and the severity of it appears from the great number of martyrs mentioned in the old martyrologies. The *fourth persecution*, under Marcus Aurelius (161-180), at different places, with several intermissions and different degrees of violence, continued the greatest part of his reign. It raged with particular fury in Smyrna and Lyons, and Vienne in Gaul. Polycarp and Justin Martyr are famous victims of this period. The *fifth* began in 197 under Severus. During the *sixth persecution*, under Maximian (235-238), only Christian teachers and ministers were persecuted. Decius began his reign (249) with a persecution of the Christians (the *seventh*) throughout his dominions. This was the first really general persecution. Valerian in 257 put to death few but the clergy (*eighth persecution*); and the execution of the edict of Aurelian against the Christians (274)—the *ninth persecution*, as it was called—was prevented by his violent death. A severe persecution of the Christians (the *tenth*) took place under the Emperor Diocletian (303). Throughout the Roman Empire their churches were destroyed, their sacred books burned, and all imaginable means of inhuman violence employed to induce them to renounce their faith. Persecutions, principally directed against the clergy, continued with more or less vigor until Constantine the Great (312 and 313) restored to the Christians full liberty and the use of their churches and goods; and his conversion to Christianity made it the established religion in the Roman Empire.

**Perseph'onē**, in Greek mythology, the daughter of Zeus and Dēmētēr (Ceres). While she was gathering flowers near Enna in Sicily Pluto carried her off to the infernal regions, with the consent of Zeus, and made her his wife, but in answer to the prayers of Dēmētēr she was permitted to spend the spring and summer of each year in the upper world. In Homer she bears the name of Persephoneia. The chief seats of the worship of Persephonē were Attica and Sicily. In the festivals held in her honor in autumn the celebrants were dressed in mourning in token of lamentation for her being carried off by Pluto, while at the spring festivals they were clad in gay attire in token of joy at her return. In works of art Persephonē is sometimes represented as sitting by the side of her husband, and sometimes alone.

**Persep'olis**, a Persian city of great antiquity, famous for its magnificent ruins, situated in a

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fertile valley of the present prov. Farsistan. Its foundation is generally ascribed to Cyrus, but its history is involved in much doubt. It was one of Persia's capitals, and the place of burial for many of its monarchs. The remains of large marble columns, vast portals, walls, huge figures, bas reliefs, etc., amply prove the former magnificence of its royal palace and temples.

**Perseus** (per'sūs), an ancient Greek hero, son of Danaë and Zeus. He was set adrift in the sea on his birth, in a chest along with his mother. But the chest reached the Island of Seriphos, and Perseus was brought up by the king of the island, who exacted a promise from him to fetch the head of the Gorgon Medusa. This he accomplished under the guidance of Hermes and Athena, and with the assistance of the nymphs. He also delivered Andromeda from a sea monster, an exploit which is frequently figured in ancient art. He was king of Tiryns and founder of Mycenæ. After his death Perseus was worshipped as a hero, and placed among the stars.

**Perseus**, the last king of the Macedonians, and an illegitimate son of Philip V, succeeded his father B.C. 178, and entered keenly into the hostilities which had previously broken out against Rome. The Romans sent an army against him and gained a signal victory at Pydna 168 B.C. Perseus fled to Samothrace, but was given up to the Romans, and some years after d. in captivity at Alba, near Rome.

**Persia** (Persian *Iran*), a kingdom of Western Asia; bounded n. by Transcaucasian Russia, the Caspian, and Russian Central Asia; e. by Afghanistan and Beloochistan; s. by the Persian Gulf; and w. by Asiatic Turkey; extending for 700 mi. from north to south, and 900 mi. from east to west; area about 636,000 sq. mi.; pop. estimated 1901, 9,500,000. The country is divided into 27 provinces; capital Teheran (pop. 150,000 to 200,000); chief trade centers, Teheran, Tabreeze, Ispahan; chief ports, Bushire and Bender Abbas on the Persian Gulf. Other large towns are: Meshed, Balfroosh, Kerman, Yezd, Hamadân, Shirâz, Kazvin, Kom, Resht.

**Physical Features.**—Persia may be considered as an elevated plateau, broken by clusters of hills or chains of rocky mountains, which alternate with extensive plains and barren deserts; the desert of Khorassan in the northeast alone absorbs about one seventh of the entire area. Low tracts exist on the Persian Gulf and the Caspian. The interior plains have an elevation of from 2,000 to 6,000 ft. above the sea. This vast central plateau is supported in the north and south by two great mountain chains or systems, and from these all the minor ranges seem to spring. The north chain, an extension of the Hindu Kush, enters Persia from Northern Afghanistan, proceeds across the country, and reaches its greatest elevation on the south of the Caspian, where it takes the name of the Elburz Mountains, and attains in Mount Demavend a height of nearly 20,000 ft. Still farther west it becomes linked with the mountains of Ararat. The

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other great mountain system runs from northwest to southeast nearer the Persian Gulf, is of considerable width and forms several separate ranges. In one of these an elevation of 17,000 ft. is reached. The rivers are few and insignificant. Not one of them is of any navigable importance, except the Euphrates, which only waters a small portion of the southwest frontier, and the Karun, recently opened to the navigation of the world. The latter is entirely within Persian territory, and flows into the Shat-el-Arab, or united Tigris and Euphrates. Of the streams which flow northward into the Caspian the only important one is the Kizil-Uzen (or Sefid Rud) (White River), which has a course of about 350 mi. There are a great number of small fresh-water lakes, and a few very extensive salt lakes, the largest being Urumiah in the extreme northwest.

**Climate, Products, etc.**—The climate varies considerably in different provinces, and in the central plateau intense summer heat alternates with extreme cold in winter. The shores of the Persian Gulf are scorched up in summer; those of the Caspian Sea, especially the parts covered with dense forest, are humid, but also noted for malaria. The mineral wealth of Persia is but little developed. Iron, copper, lead, antimony, are abundant; sulphur, naphtha, and rock-salt unlimited; coal also exists. The turquoise mines of Nishapur are about the only ones receiving anything like adequate attention. The interior of Persia, particularly its eastern and southern regions, is mostly devoid of vegetation over large areas; the southwest has its forests of stunted oaks and other trees, and jungle; but on the Caspian the mountain sides are covered with dense and magnificent woods of oak, beech, elm, and walnut, intermingled with box-trees, cypresses, and cedars. Lower down wheat and barley are extensively cultivated. In the level and rich plains below the sugar cane and orange come to perfection; the pomegranate grows wild; the cotton plant and mulberry are extensively and successfully cultivated, and large tracts are occupied by the vine, and orchards producing every kind of European fruit. In the low plains the only grain under extensive and regular culture is rice; the principal subsidiary crops are cotton, indigo, opium, sugar, madder, and tobacco. Excellent dates are produced on the southern coast tracts. Irrigation is well understood and extensively practised. The domestic animals are, sheep, chiefly of the large-tailed variety; goats, some of which produce a wool little inferior to that of Cashmere; asses and mules of a large and superior description; horses of Arab, Turkoman, and Persian breeds, and camels. Wild animals include the lion, leopard, wolf, jackal, hyena, bear, porcupine, wild ass, gazelle, etc.

**Manufactures and Trade.**—The manufactures of Persia were once celebrated, but excepting some carpets and shawls it may be said that the country has ceased to export manufactured articles. Its chief exports now are rice, dried fruits, opium, silk, wool, cotton, hides, pearls,

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and turquoises. Chief imports: textiles, china and glass, carriages, sugar, tea, coffee, petroleum, drugs, and fancy articles. The internal trade of the country is almost entirely carried on by caravans. In 1888 the first Persian railway was opened connecting the Caspian with Teheran. A projected railway includes a line from Resht to Teheran with ultimate extension to the Persian Gulf. There are some 4,000 mi. of telegraph lines in operation, and a regular postal service was organized in 1877.

*Government.*—The government of Persia is an absolute monarchy. The only control to which its ruler, the shah, is subject are the precepts of the Koran. He surrounds himself with a certain number of advisers, forming a ministry, eleven of whom are heads of special departments. These ministers he calls and dismisses at pleasure. The revenue, chiefly derived from land and poll taxes, import and export duties, transit duties on telegrams, tributes from nomadic tribes, etc., is estimated at \$8,750,000 (about one sixth from customs); there is no public debt. An army of some 100,000 is being reorganized under foreign officers.

*People.*—The population is chiefly made up of Iranians or pure Persians and Turanians (Turkish and Tartar tribes), and in religion belongs almost exclusively to the Shiah sect of Mohammedans, or more properly to a subdivision of that sect. The priesthood is very influential and very bigoted. Education is comparatively well attended to, Persia being considered, next to China, the best educated country in Asia. The Persians are rather short and slender built, fair in complexion, hair long and straight, but beard bushy, and almost invariably jet black. The women are beautiful, intellectual, and polite. The Persian is celebrated for his affable manners, but also for his craft and deceit. Polygamy is both authorized and encouraged.

*History.*—The original country of the Persians occupied a small portion of modern Persia on the north of the Persian Gulf. After being under the Assyrians, and next under the Medes, Cyrus (b.c. 559–529), by conquering and uniting Media, Babylonia, Lydia, and all Asia Minor, became the founder of the Persian Empire. The empire was further extended by his son and successor Cambyses (b.c. 529–522), who conquered Tyre, Cyprus, and Egypt; and by Darius I, who subdued Thrace and Macedonia, and a small part of India. His son Xerxes (486–465 b.c.) reduced Egypt, which had revolted under his father, and also continued the war against the European Greeks, but was defeated on the field of Marathon and at Salamis (480 b.c.), and obliged to defend himself against their attacks in a disastrous war. Artaxerxes I (b.c. 465–425) had a long and comparatively peaceful reign. Artaxerxes was followed by Darius II, or Darius Nothus, Artaxerxes II (Mnemon), Artaxerxes III (Ochus), and Darius III (Codomannus (b.c. 338–330), the last of this dynasty, known as the Achæmenian dynasty. He was defeated by Alexander the Great in three battles, lost his life, and the empire

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passed into the hands of his conqueror. On the dissolution of the Macedonian Empire, after the death of Alexander (323), Persia ultimately fell to his general Seleucus, and his successors the Seleucidæ (312). They reigned over it till 236 b.c., when the last Seleucus was defeated and taken prisoner by Arsaces I, the founder of the dynasty of the Arsacidæ and of the Parthian Empire, of which Persia formed a portion, and which lasted till 226 a.d. The supremacy was then recovered by Persia in the person of Ardishir Babigân (Artaxerxes), who obtained the sovereignty of all Central Asia, and left it to his descendants the Sasanidæ, so called from Sassan, the grandfather of Ardishir. This dynasty continued to reign for about 417 years under 26 sovereigns. The reign of Sapor II, called the Great (310–381), and that of Chosroes I (Khosru, 531–579), were perhaps the most notable of the whole dynasty. The latter extended the Persian Empire from the Mediterranean to the Indus, from the Jaxartes to Arabia and the confines of Egypt. He waged successful wars with the Indians, Turks, Romans and Arabs. Chosroes II (591–628), made extensive conquests, but lost them again in the middle of the reign of the Byzantine Emperor Heraclius. His son Ardishir (Artaxerxes) III, but seven years old, succeeded him, but was murdered a few days after his accession. He was the last descendant of the Sasanidæ in the male line. Numerous revolutions now followed, until Yezdigerd III, a nephew of Chosroes II, ascended the throne in 632 at the age of sixteen. He was attacked and defeated by Caliph Omar in 639–636, and Persia became for more than 150 years a province of the Mohammedan Empire. The Arab conquest had a profound influence on Persian life as well as on the language and religion. The old Persian religion was given up in favor of Mohammedanism, only the Guebres remaining true to the faith of their fathers.

About the beginning of the ninth century the Persian territories began to be broken up into numerous petty states. The Seljuks, a Turkish dynasty, who first became powerful about 1037, extended its dominions over several Persian provinces, and Malek-Shah, the most powerful of them, conquered also Georgia, Syria, and Asia Minor. Through Genghis Khan the Tartars and Mongols became dominant in Persia about 1220, and they preserved this ascendancy till the beginning of the fifteenth century. Then appeared (1387) Timurlenk (Tamerlane) at the head of a new horde of Mongols, who conquered Persia and filled the world from Hindustan to the extremities of Asia Minor with terror. But the death of this famous conqueror in 1405 was followed not long after by the downfall of the Mongol dominion in Persia, where the Turkomans thenceforward remained masters for 100 years. The Turkomans were succeeded by the Sufi dynasty (1501–1736). The first sovereign of this dynasty, Ismail Sufi, pretended to be descended from Ali, the son-in-law of Mohammed. He assumed the title of shah, and introduced the sect of Ali (the Shiite or Shiah



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sect). The great Shah Abbas (1587–1628) introduced absolute power, and made Ispahan his capital. Under Shah Soliman (1666–94) the empire declined, and entirely sunk under his son Hussein. A period of revolts and anarchy followed until Kuli Khan ascended the throne in 1736 as Nadir Shah, and restored Persia to her former importance by successful wars and a strong government. In 1747 Nadir was murdered by the commanders of his guards, and his death threw the empire again into confusion. Kerim Khan, who had served under Nadir, succeeded after a long period of anarchy, in making himself master of the whole of Western Iran or modern Persia. He died in 1779. New disturbances arose after his death and continued till a eunuch, Aga Mohammed, a Turkoman belonging to the noblest family of the tribe of the Kajars, and a man of uncommon qualities, seated himself on the throne, which he left to his nephew, Baba Khan. The latter began to reign in 1796 under the name of Futeh Ali Shah, and fixed his residence at Teheran. This monarch's reign was in great part taken up with disastrous wars with Russia and Turkey. In 1813 he was compelled to cede to Russia all his possessions north of Armenia, and in 1828 his share of Armenia. Futeh Ali died in 1834, leaving the crown to his grandson Mehemet Shah, during whose reign Persia became constantly weaker, and Russian influence in the country constantly greater. He died in 1848, and was succeeded by his son Nassr-ed-Din, the present shah, b. 1829. He has had to suppress a number of insurrections, and in 1851 a serious rebellion of the pure Persian party in Khorassan, who refused obedience to the Kajar dynasty on religious grounds. In May, 1852, he annexed the Sultanate of Herat, but was compelled to relinquish it by the British, and a second occupation in 1855 resulted in the landing of a British force on the Persian Gulf, the capture of Bushire, and the Peace of Paris (March 3, 1857). Persia has since come into the possession of portions of territory formerly belonging to Omân, Afghanistan, and Beluchistan. On the northeast the boundary between Persia and the Russian territory beyond the Caspian, after remaining long uncertain, was settled in the end of 1881, the lower course of the river Atrek, and farther east certain mountain ridges north of that river, forming the new boundary line. The shah visited the various European courts in 1873 and 1889.

*Language and Literature.*—Iranian is the name now usually given to all forms of the Persian language, which belongs to the great Indo-European or Aryan division of languages. The oldest form of the language is called Old Bactrian or Zend. It is that in which the Zendavesta (or sacred Zoroastrian writings—see *Zendavesta*) was originally composed, and is very closely allied to the Old Sanskrit of the Vedas. The next development of the Iranian language is the Old Persian of the cuneiform inscriptions of the Achæmenian dynasty. We then lose sight of the Iranian language, and in the inscriptions and coins of the Sassanian

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kings, and in the translations of the Zendavesta made during the period of their sway in Persia, we find a language called Pehlevi or Pehlvi, which is strictly merely a mode of writing Persian, in which the words are partly represented by their Semitic equivalents. This curious disguised language is also known as *Middle Persian*. *New Persian* was the next development, and is represented in its oldest form in the *Shanameh* of Firdusi (about 1000 A.D.). In its later form it is largely mingled with Arab words and phrases, introduced with Mohammedanism after the Arab conquest. The written character is the Arabic, but with four additional letters with three points. The Persians possess rich literary treasures in poetry, history, and geography, but principally in the former. Among the most brilliant of Persian poets are: Rudagi, a lyric and didactic poet (flourished about 952), regarded as the father of modern Persian poetry; the epic poet Firdusi (beginning of eleventh century), whose most celebrated work is the poetical history the *Shanameh* (*Book of Kings*) in 6,000 couplets; Omar Khayyam (d. 1123), the author of celebrated "*Quatrains*;" Nisâmi (twelfth century), a didactic poet; Sadi (thirteenth century), a lyric and moral poet, author of the *Gulistan* or *Rose Garden*, a collection of stories; Rumi, his contemporary, a great mystic and didactic writer, etc.; Hafiz (b. about the beginning of the fourteenth century), the most celebrated writer of odes; Jami (fifteenth century), one of the most productive and most captivating of Persian poets. In the sixteenth century literary production almost ceased. Kaani, poet laureate to the present shah, has written poetry of no little merit. The Persians are remarkable as being the only Mohammedan nation which has cultivated the drama. Their productions in this province of literature closely resemble the mysteries of the Middle Ages, and abound in natural and affecting lyrical passages. Not less numerous are the prose fables, tales, and narratives, many of which have been translated into English, French, German, and other European languages. It was also through the Persian that much of the Indian literature in fables and tales was transmitted to the Arabs, and thence to Europe. In the departments of history, geography, and statistics the Persians have some large and valuable works. Tabari is the earliest historian (d. 923 A.D.). Mirkhond, who flourished in the fifteenth century, wrote a voluminous work on the *History of Persia down to 1471*. Geometry and astronomy were also cultivated with ardor by the Persians, but their knowledge on these subjects is in a great measure borrowed from the Arabians. Religious works are also numerous; besides those treating of Mohammed and Mohammedan religion, they have translations of the Pentateuch and the Gospels. The Persians have also translated many works belonging to old Indian literature, among others the epics *Ramayana* and *Mahabharata*, besides the abridgment of the *Vedas*. They have also paid great attention to their own language; of this the number of lexi-

## Persian Gulf

cographical and grammatical works extant affords abundant proof.

**Persian Gulf**, a gulf separating Persia from Arabia, and communicating with the Indian Ocean by the Strait of Ormuz, 35 mi. wide; greatest length 560 mi.; medium breadth 180 mi. It receives the waters of the united Euphrates and Tigris, and of a number of small streams; the principal port is Bushire. There are many islands in the gulf; the largest are, Kishim, Ormuz, and the Bahrein Isles; in the neighborhood of the latter there are lucrative pearl fisheries.

**Persian Wheel** (or Noria), the *Pisaro* of the south of France, a machine for raising water to irrigate gardens, meadows, etc., employed from time immemorial in Asia and Africa, and introduced by the Saracens into Spain and other European countries. It consists of a double water wheel, with float boards on one side and a series of buckets on the other, which are movable about an axis above their center of gravity. The wheel is placed in a stream, the water turns it, and the filled buckets ascend; when they reach the highest point, their lower ends strike against a fixed obstacle, and the water is discharged into a reservoir. In Portugal, Spain, South of France, and Italy, it is extensively used, and has been modified to enable it to draw water also from ponds and wells, animals supplying the motive power, and pots, leather or other bags taking the place of buckets.

**Persigny** (per-sèn-yè), JEAN GILBERT VICTOR FIALIN, DUC DE (1808-1872), French statesman. He instigated and took part in the military rising at Strasburg in 1836, and was arrested, but escaped. In 1840 he shared Napoleon's expedition to Boulogne, was again captured, and for a time kept in confinement. On the outbreak of the revolution of February, 1848, he hastened to Paris, contributed largely to determine the vote by which Napoleon was elected president (Dec. 10, 1849), and was also one of the most prominent actors in the *coup d'état*, by which he became Napoleon III. He held the office of minister of the interior from 1852-54, and again from 1860-63; was appointed member of the senate 1852, ambassador to Great Britain 1855. He was elevated to the rank of duke in 1863.

**Persim'mon**, the fruit of a tree inhabiting the Southern states, where it attains the height of 60 ft. or more. The fruit is succulent, reddish, and about the size of a small plum, containing a few oval stones. It is powerfully astringent when green, but when fully ripe the pulp becomes soft, palatable, and very sweet.

**Personal Actions**, in law, are actions brought for the specific recovery of goods and chattels, or for the redress of breaches of contract or other injuries, in contradistinction to *real actions*, brought for the recovery of lands, tenements, and other heritable property.

**Personality** (or Personal Property), movables; chattels; things belonging to the person, as money, jewels, furniture, etc., as distinguished from *real estate* in lands and houses.

## Perspective

**Perspec'tive**, the art or science which teaches how to produce the representation of objects on a flat surface so as to affect the eye in the same manner as the object or objects themselves when viewed from a given point. Perspective is intimately connected with the arts of design, and is particularly necessary in the art of painting, as without correctness of perspective no picture can be entirely satisfactory. Perspective alone enables us to represent foreshortenings with accuracy, and it is requisite in delineating even the simplest positions of objects. That part of perspective which relates to the form of the objects differs essentially from that which teaches the gradation of colors according to the relative distance of objects. Hence perspective is divided into *mathematical* or *linear perspective*, and the perspective of color or *aerial perspective*. The contour of an object drawn upon paper or canvas represents nothing more than such an intersection of the rays of light sent from the extremities of it to the eye, as would arise on a glass put in the place of the paper or canvas. Suppose a spectator to be looking through a glass window at a prospect without, he will perceive the shape, size, and situation of every object visible upon the glass. If the objects are near the window the spaces they occupy on the glass will be larger than those occupied by similar objects at a greater distance; if they are parallel to the window, their shapes upon the glass will be parallel likewise; if they are oblique, their shapes will be oblique; and so on. As the person alters his position, the situation of the objects upon the window will be altered also. The horizontal line, or line corresponding with the horizon, will in every situation of the eye be upon a level with it, that is, will seem to be raised as far above the ground upon which the spectator stands as his eye is. Now suppose the person at the window keeping his head steady draws the figure of an object seen through it upon the glass with a pencil, as if the point of a pencil touched the object, he would then have a true representation of the object in perspective as it appears to his eye. Representations of objects have, however, generally to be drawn on opaque planes, and for this purpose rules must be deduced from optics and geometry; and the application of these rules constitutes what is properly called the art of perspective. Linear perspective includes the various kinds of *projections*. *Scenographic* projections represent objects as they actually appear to the eye at limited distances. *Orthographic* projections represent objects as they would appear to the eye at an infinite distance, the rays which proceed from them being parallel instead of converging. It is the method on which plans and sections are drawn. A *birds-eye view* is a scenographic or orthographic projection taken from an elevated point in the air from which the eye is supposed to look down upon the objects. *Aerial perspective* teaches how to judge of the degree of light which objects reflect in proportion to their distance, and of the gradation of their tints in proportion to the intervening air.

## Perth

By its application each object in a picture receives that degree of color and light which belongs to its distance from the spectator. The charm and harmony of a picture, particularly of a landscape, depend greatly upon correct aerial perspective.

**Perth**, a city and royal and parliamentary burgh of Scotland, capital of the county of the same name, on the right bank of the Tay, and at the common junction of railways from Dundee, Aberdeen, Glasgow, Edinburgh, and Inverness.

**Perth**, capital of Western Australia, on the Swan River, 12 mi. above its port, Freemantle (at the mouth of the Swan River, pop. 4,000). It was founded with the Swan River Settlement in 1829, is well laid out, with broad streets, and has some good buildings. Pop. 9,617.

**Perth Amboy**, Middlesex co., N. J., 21 mi. s.w. of New York. Railroads: Penna. & Lehigh Valley; New Jersey Central; Staten Island. In the vicinity are deposits of fire clay and kaolin. Industries include fire brick works, cork, terra cotta, white ware, and drain-pipe factories. Pop. 1900, 17,699.

**Perturbations**, the orbital irregularities or deviations of the planets from their regular elliptic orbits. These deviations arise, in the case of the primary planets, from the mutual gravitations of these planets toward each other, which derange their elliptic motions round the sun; and in that of the secondaries, partly from the mutual gravitation of the secondaries of the same system, similarly deranging their elliptic motions round their primary, and partly from the unequal attraction of the sun on them and on their primary.

**Peru**, Miami co., Ind., on Wabash River. 75 mi. n. of Indianapolis. Railroads: L. E. & W.; Wabash main line, and junction of main line of Wabash and Detroit line of Wabash. Industries: three flouring mills, two iron foundries, woolen mill, bagging mills, railroad shops, electrical works, etc. Gas in vicinity. Surrounding country agricultural. The town was first settled in 1834 and became a city in 1867. Pop. 1900, 8,463.

**Peru'**, a republic of South America, bounded on the n. by Ecuador, on the w. by the Pacific Ocean, on the s. by Chile, and on the e. by Bolivia and Brazil; area 695,733 sq. mi.; the official pop. in 1890 was 2,970,000. The population consists of about 57 per cent. aboriginal Indians, 23 per cent. mixed Indian races, and 20 per cent. of descendants of Spaniards, Europeans (chiefly Italians, French, and Spaniards), and Asiatics (chiefly Chinese). Principal towns: Lima, the capital; Arequipa, Cuzco, and Truxillo; principal ports, Callao (port of Lima), Mollendo (port of Arequipa), and Truxillo. Pop. 1901, est. 1,500,000 to 4,700,000.

**Physical Features.**—This country exhibits great varieties of physical character. It is traversed throughout its length by the Andes, running parallel to and on an average 60 mi. distant from the coast, the region between largely consisting of sandy desert, except where watered by transverse mountain streams. The

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Andes consist here of two main chains or Cordilleras, connected by cross ranges, enclosing extensive and lofty valleys and plateaus. The Andes region is roughly estimated at about two fifths of the entire area of Peru. The loftiest summits are in the southern portion of the West Cordillera; several peaks attain there an altitude of nearly 20,000 ft., and the Chuquibamba rises to 21,000 ft. The country east of the Cordilleras, forming a part of the Amazon basin, and mostly covered by dense forest, is but little known and almost exclusively in possession of the native Indians. It is called *Montaña* or *Los Bosques*. The elevated region between the gigantic ridges of the East and West Cordilleras, called *Las Sierras*, is now the chief, as it was anciently almost the exclusive seat, of the population of Peru. It is partly occupied by mountains and naked rocks, partly by table-lands yielding short grass, and extensive hilly pasture grounds, and partly by large and fertile valleys. The most important districts are those of Pasco, of Cuzco, the valleys of the Rio Jauja, and of the Marañon or Amazon. The first of these lies at one of those points where the branches of the Andes unite, the ridges sinking into an elevated plain, which has here a general height of 14,000 ft. The veins of the precious metals, with which this region abounds, have attracted to it a comparatively dense population. The table-land of Cuzco descends from an elevation of less than 12,000 ft. in the south to about 8,000 ft. in the north. Of the lakes Lake Titicaca (12,542 ft. above sea level) is the largest in South America, and which partly belongs to Bolivia, is the only one of commercial importance. The chief rivers are the Marañon or main stream of the Amazon, and the Huallaga and Ucayale, which join the Marañon; the Ucayale, formed by the united waters of a number of streams (Apurimac, Urubamba, Paucartambo), being about the same size as that river. In the maritime region of Peru earthquake shocks are of common occurrence, and some of them have been of exceptional severity, the most disastrous being those of 1746, 1868, and 1877. Gold and silver occur in all the provinces of Peru, and form the chief wealth of the country. Quicksilver is also abundant. Copper, lead, and iron also exist in various places.

**Climate.**—The climate of Peru is as varied as its physical aspect. On a portion of the coast no rain has fallen within the memory of man, but the *garua*, a thick heavy mist often accompanied by drizzling rain, is a partial compensation, and the rivers from the Andes afford means of irrigation for sugar and cotton plantations. From November to April the sky is cloudless, and were it not for the cool oceanic currents, and the streams of cold air from the snowy Andes, the heat would be unbearable. Fortunately the rainy seasons in the mountains corresponds with this period. The central plateau region has a mild and comparatively humid climate, but the higher regions are inclement and subject to terrific tempests. East of the Andes the regular equatorial winds from the east come loaded with humidity, and,



## Peru

checked by the mountains, pour down copious, and in some places perpetual rains.

*Plants and Animals.*—Peru is incomparably rich in botany, each region having its own flora. In the less elevated portions of the Eastern Andes a tropical vegetation is found; while on the higher parts representatives of Alpine families (as the gentians) luxuriate. In the forests of Eastern Peru cinchona trees grow abundantly and supply the valuable bark from which the quinine is extracted. The same zone, and especially the hot plains and swamps, also supply coca, the medicinal properties of which have for centuries been known to the natives of Peru and Bolivia, who chew the leaves as a stimulant. Tobacco, cotton, sugar, rice, coffee, cocoa, and maize are grown in various parts and in increasing quantities. The eastern face of the Andes is as remarkable for its fauna as it is for its flora. The forests on the lower ranges and in the plains swarm with many species of parrots and monkeys; the tapir, sloth, ant-eater, armadillo, etc., are found here; the rivers are alive with alligators; and in the inundated plains the boa-constrictor attains a huge size. The puma and the South American bear inhabit the higher levels; the llama, the guanaco, the alpaca, and the vicuña, the still more elevated regions.

*Commerce.*—Peru exports precious metals, silver ores, guano, cubic niter, wool of the llama, alpaca, and vicuña, cotton, sugar, cinchona bark, coca leaves and cocaine, chin-chilla skins, and hides. The chief imports are machinery, cotton, woolen, and linen goods, and provisions. The trade of the country has suffered much from revolutions, and more from the disastrous war with Chile (1879-83). The export of guano and cubic niter has naturally declined since the Chileans possessed themselves of the guano deposits of the Lobos Islands, and of the province of Tarapacá, which contains the richest nitrate beds. The total amount of the exports and imports cannot be stated, but in 1901 the exports were estimated at \$10,000,000, and the imports at \$7,000,000. The internal trade of the country has been fostered by the construction of railways, one of which attains a height of 15,600 ft. in its passage through the Andes, and exhibits remarkable engineering works. Some 2,000 mi. have been constructed at a cost of about \$170,000,000, but only about 1,500 mi. are in working order. The chief denomination of money is the *sole*—about 77 cents.

*Government, etc.*—The government is based on a constitution adopted in 1867, and modeled on that of the U. S. The legislative power is in the hands of a senate and a house of representatives, the senate being composed of two senators from each province, and the house of representatives containing one member for every 20,000 of the population. The president, elected for four years, is the executive. The estimated revenue for 1890 was \$4,800,000; the expenditure \$4,791,500. Peru has a foreign debt amounting to \$273,000,000, including unpaid interest since 1876. In 1890 this debt was settled by transfer of all the railways of the

## Perugino

state to the bondholders. There is besides an internal debt of \$65,000,000. In Peru the Indian is on a level in political rights with the white man; there exists absolute political but not religious freedom, the constitution prohibiting the exercise of any other religion than the Roman Catholic. There is, however, a considerable amount of tolerance. Education is compulsory and free. There are universities at Lima, Arequipa, and Cuzco. The Peruvian language, of which there are many dialects, still maintains itself alongside of the language of the conquerors.

*History.*—Of the early history of Peru we are almost entirely ignorant, but existing ruins, spoils secured by the Spaniards, and the descriptions left us by the historians of the Spanish conquest, sufficiently prove that the ancient Peruvians had no mean knowledge of architecture, sculpture, metal work, etc. They also had made considerable progress in astronomical science. The early religion of the Peruvians is bound up in the god Viracocha, the creator of the sun and the stars, and from him the incas or emperors claimed descent as the sons of the sun. Under the incas the empire was divided into four parts, corresponding to the four cardinal points; each division had a separate government, presided over by a viceroy of royal blood. All the land belonged to the inca; and trade was carried on by barter, money being unknown. The thirteenth monarch of the incas was reigning when the Spanish adventurer Pizarro disembarked in Peru in 1531. The inca was taken prisoner (1532), numbers of his subjects were massacred, and the whole country fell in a short time into the hands of the invaders. It was then formed into a Spanish viceroyalty; subsequently part of it was incorporated in New Granada, and the viceroyalty of Buenos Ayres was constructed out of some of the provinces. In 1821 the country proclaimed its independence, but did not obtain actual freedom from Spanish rule until 1824, after a prolonged war. Since then Peru, like the rest of the South American republics, has suffered much from dissensions and revolutions. In the spring of 1879 it joined Bolivia in a war against Chile, resulting in the complete defeat of both the former.

**Peru, La Salle co., Ill.,** on the Illinois River at head of navigation on the Illinois and Michigan Canal. Railroads: C. B. & Q., and C. R. I. & P. Industries: zinc works, plow factories, scale, and pump factories, boiler, foundry, and machine shops, large breweries, etc. Coal is mined and ice made. Pop. 1900, 6,863.

**Peru, Miami Co., Ind.,** on the Wabash R., 75 mi. n. of Indianapolis. R.R.'s: Wabash; Lake Erie and Western; Cincin., Rich. and Muncie. It is the county seat, has a public library and a sanatorium. Industries: railroad shops, carbon works, glass works, steel works, basket factory, woolen mills. Pop. 1900, 8,463.

**Perugino** (per-ŭ-jē'nō), PIETRO VANUCCI (1446-1523), the founder of the Roman school of painting, b. at Città della Pieve. His easel pictures were done in his earlier practise in tempera, but he afterward became a master in

## Peshawar

the oil method. About 1480 Pope Sixtus IV called him to Rome, where he was employed along with Signorelli, Ghirlandaio, Botticelli, and Rosselli in decorating the Sistine Chapel with frescoes. Fine specimens of his frescoes are preserved in Perugia, Rome, Bologna, and Florence, and specimens of his other works are not infrequent in European galleries.

**Pesha'war**, a town of India, in the Punjab, capital of the division of the same name, 12 mi. e. of the eastern extremity of the Khyber Pass. It covers a large area, is surrounded by a mud wall, and commanded by the Bala Hissar, a fort which crowns an eminence just outside the walls. It has several good mosques, but few architectural attractions. It is favorably situated for commerce, lying in the great route from Bokhara and Cabul to India. The population, including the military cantonment 2 mi. w. of the city proper, is 79,982. The cantonment accommodates a large force, the population in it being about 20,000. The division or commissionership comprises the districts of Peshawar (area 2,504 sq. mi.; pop. 592,674), Hazara, and Kohat, with the control of part of the hill tribes inhabiting the Khyber Pass. Area 8,381 sq. mi.; pop. 1,181,289.

**Pessimism**, a modern term to denote the opinion or doctrine that maintains the most unfavorable view of everything in nature, and that the present state of things only tends to evil; that in human existence there is an enormous surplus of pain over pleasure, and that humanity can find real good only by abnegation and self-sacrifice. It is antithetical to *optimism*, and as a speculative theory is the work of Schopenhauer and Von Hartmann, though it is precluded in the metaphysics of Brahmanism and the philosophy of Buddhism.

**Pestalozzi**, JOHANN HEINRICH (1746-1827), a Swiss philanthropist and educational reformer. He first studied theology, then law; and subsequently became concerned in a calico manufactory. Afterward he devoted his time and substance to the children of paupers, whom he collected in large numbers in his own house; and this good work he carried on for over twenty years without outside aid or even sympathy. The want of means at last compelled him to abandon his gratuitous institution, and to seek pupils who could pay for their maintenance and instruction. After a few years' successful teaching in various places he opened a school in the Castle of Yverdon (canton Vaud), which the government had placed at his disposal. His novel *Lienhardt and Gertrud* (1781-89, 4 vols.) exerted a powerful moral influence, while his educational treatises have laid the foundation for the more rational system of elementary instruction which now obtains in Europe. The grand principle that lay at the basis of Pestalozzi's method was that of communicating all instruction by direct appeal to the senses and the understanding, and forming the child by constantly calling all his powers into exercise, instead of making him a mere passive recipient, selecting the subjects of study in such a way that each step should best aid the further progress of the pupil.

## Peter I

**Petaluma**, Sonoma co., Cal., on Petaluma River, 36 mi. from San Francisco. Industries: silk mills, flouring mills, two iron foundries, woolen mills, incubator factories, farm implement, and harness factories. Surrounding country agricultural and dairy. The town was first settled by the Spanish in 1835, and became a city in 1851. Pop. 1900, 3,871.

**Petcho'ra**, a river of Russia, rises in the north of the government of Perm, on the western slope of the Ural Mountains, and after a course of about 900 mi. falls into a bay of the Arctic Ocean by a number of mouths.

**Peter** THE APOSTLE, commonly called Saint Peter, was a Galilean fisherman from Bethsaida. He became the disciple of Christ. His zeal and eloquence made him often the speaker in behalf of his fellow apostles on important occasions, and his opinions had great influence in the Christian churches. Nothing certain is known of his subsequent life, but it is almost beyond doubt that he was a joint founder of the church at Rome, and that he suffered martyrdom there, most likely under Nero.

**Peter** THE CRUEL (1334-1369), king of Castile and Leon. He succeeded his father in 1350. His reign was one long series of cruelties and despotic acts. In 1353 he married, though contrary to his will, Blanche of Bourbon, one of the most accomplished princesses of the time, whom, however, he abandoned two days after his marriage in order to rejoin his mistress Maria Padilla. He afterward married the beautiful Juana de Castro, but only to abandon her after a few months. Two revolts against him were unsuccessful.

**Peter** THE HERMIT, an enthusiastic monk of Amiens, whose preaching, after a pilgrimage to Jerusalem, gave rise to the first Crusade. Peter led the way through Hungary at the head of an undisciplined multitude of more than 30,000 men, a comparatively small number of whom survived to reach their destination, and distinguished himself by his personal courage at the storming of the holy city. On his return to his native country he founded the abbey of Noirmoutier, and d. its first superior in 1115.

**Peter I** (THE GREAT), ALEXEIEVITCH (1672-1725), emperor of Russia. In 1682 Peter was declared czar, with his mother, the Czarina Natalia Kirilovna, as regent. Sophia, third daughter of Alexis, ambitious to govern, succeeded in having Ivan proclaimed czar jointly with Peter, and herself regent. Peter was relegated to private life, his education purposely neglected, and his bad habits encouraged. In 1689 he wrested the power from his sister, and confined her in a convent. Peter was now virtually sole emperor, though, till the death of his brother in 1697, he associated his name with his own in the ukases of the empire. He now determined to do what he could to raise his country out of its barbarism, and to place its people in the ranks of civilized nations. His journey to Holland and England (1697-98), when he practically worked in shipyards, is familiar; and the knowledge he there gained was amply profited by on his return. Peter,

## Peter I

however, not only created a navy, but gave Russia a sea board and sea ports by wresting the Baltic provinces from Charles XII of Sweden. Young Russian nobles were obliged to travel; schools of navigation and mathematics were founded; agriculture was improved by the introduction of implements, seeds, and superior breeds of cattle. Peter imported foreign artisans of all kinds, established manufactories of arms, tools, and fabrics, and distributed metallurgists through the mining districts of Russia; roads and canals were made to foster internal commerce, and to extend trade with Asia. In 1703 he laid the foundation of St. Petersburg, and twenty years later of its Academy of Sciences. Laws and institutions which in any way interfered with his projects, he either abolished or altered. In his zeal to do good he was too frequently injudicious in choosing times and seasons, and the least show of opposition irritated him into ferocity. He repudiated his wife a few years after marriage for her reactionary leanings; for the same reason his son Alexis was ill treated, compelled to renounce the succession, and condemned to death, but d. suddenly before sentence could be carried out. In 1707 he had married his mistress Catharine; this marriage was publicly celebrated in 1712; Catharine was crowned in 1724, and succeeded Peter after his death.

**Peter I, KARAGEORGEVITCH (1846—)**, King of Serbia, born in Belgrade; son of a deposed prince. After 1848 he participated in many wars under foreign flags and finally settled at Geneva, Switzerland. On June 15, 1903, he was elected King of Serbia, four days after the murder of King Alexander.

**Peter II, ALEXEIEVITCH**, emperor of Russia, grandson of Peter the Great and son of Alexis, ascended the throne in consequence of the will of Catharine I, in 1727, when but thirteen years old. He d. in 1730, and was succeeded by Anna Ivanovna.

**Peter III, FEODOROWITCH (1728-1762)**, emperor of Russia, was the son of Anna Petrovna, daughter of Peter the Great and the Duke of Holstein. Peter III ascended the throne in 1762, but on account of his German proclivities and other causes a conspiracy broke out; he abdicated, and was murdered.

**Peterborough**, a flourishing town of Canada, prov. Ontario, on the river Otonabee, 26 mi. n. of Lake Ontario. It is well built; has manufactures of machinery, agricultural implements, etc., and being a railway center has a good trade. Pop. 9,717.

**Peter's, SAINT**, the Cathedral of Rome, the largest and one of the most magnificent churches in Christendom. It is a cruciform building in the Italian style, surmounted by a lofty dome, built on the legendary site of St. Peter's martyrdom. In 306 Constantine the Great erected on this spot a basilica of great magnificence. In the time of Nicholas V it threatened to fall into ruins, and he determined on its reconstruction, but the work of restoration proceeded slowly, and Julius II

## Petrarch

(1503-13) decided on the erection of an entirely new building. He laid the foundation stone of the new cathedral on April 18, 1506, and selected the famous Bramante as his architect. After the latter's death various architects had charge of the work until Michael Angelo was appointed in 1546. He nearly completed the dome and a large portion of the building before his decease (1564). The nave was finished in 1612, the façade and portico in 1614, and the church was dedicated by Urban VIII on Nov. 18, 1626. The extensive colonnade which surrounds the piazza and forms a magnificent approach to the church was begun by Bernini in 1667, and the sacristy erected by Carlo Marchionni in 1780. The interior diameter of the dome is 139 ft., the exterior diameter 195½ ft.; its height from the pavement to the base of the lantern 405 ft., to the top of the cross outside 448 ft. The length of the cathedral within the walls is 613½ ft.; the width 87½ ft. The width of the side aisles is 33½ ft.; the entire width of nave and side aisles, including the piers that separate them, 197½ ft. The height of the baldacchino is 94½ ft. The circumference of the piers which support the dome is 253 ft. The floor of the cathedral covers nearly 5 acres, and its cost is estimated to have exceeded \$50,000,000.

**Petersburg**, Dinwiddle co., Va., on Appomattox River, 20 mi. s. of Richmond, Railroads: Norfolk & Western, and Richmond & Petersburg. Industries: cotton and flouring mills, tobacco factories, machinery, agricultural implements, paper manufacture, etc. Pop. 1900, 21,810.

**Petition**, a representation of grievances with an appeal for redress. The first amendment to the constitution of the U. S. provides that Congress shall make no law abridging the right of the people peaceably to assemble, and to petition the government for a redress of grievances. The right of petition has always been treated as an individual right, whereby the citizen can make his grievances known to the highest authority in the state or union.

**Petoskey**, Emmet Co., Mich., an attractive summer resort on Little Traverse Bay, an arm of Lake Mich. R.R.: Pere Marquette, G. R. & I. Seat of a normal school; industries: iron foundries, rug and carpet factory. Municipal ownership of light and water plants. Pop. 1900, 5,285.

**Petrarch** (pet' rârk) (FRANCESCO PETRARCA) (1304-1374), an Italian poet and scholar b. at Arezzo. It was at Avignon in 1327 that he first saw, in the church of St. Claire, the Laura who exercised so great an influence on his life and lyrics. After this first meeting Petrarch remained at Avignon three years, singing his purely Platonic love, and haunting Laura at church and in her walks. He then left Avignon for Lombez, where he held a canonry gifted by Pope Benedict XII, and afterward visited Paris, Brabant, Ghent, the Rhine, etc. In 1337 he returned to Avignon, bought a small estate at Vaucluse, in order to be near Laura, and here for three years wrote numerous sonnets in her praise. It was upon his Latin



## Petrel

scholarship, however, that he rested his hopes of fame. His Latin works were highly esteemed, and in 1341 he was called to Rome to receive the laureate crown awarded for his Latin poem of *Africa*, an epic on the Punic wars. At Parma he learned of the death of Laura, which he recorded on his copy of *Vergil*, and celebrated in his *Triumphs*. A large part of his time was employed in various diplomatic missions, and in 1370 he took up his residence at Arquà, near Padua, where he passed his remaining years in religious exercises.

**Petrel**, the common name of the web-footed oceanic birds of the family Procellariidae. The petrels are nocturnal in their habits, breed in holes in the rocks, lay but one egg, and are almost all of small size and more or less sombre plumage. The smaller species are well known to sailors under the name of Mother Carey's chickens, and their appearance is supposed to presage a storm.

**Petro'leum**, a variety of naphtha, called also rock or mineral oil, a liquid inflammable substance in certain localities exuding from the earth, in some places collected on the surface of the water in wells, in other places obtained in great quantities by boring. It is essentially composed of a great number of hydrocarbons; is unctuous to the touch; exhales a strong odor; flows chiefly from beds associated with coal strata, and is found in enormous quantities in various parts of the U. S., Russia, Canada, Burmah, etc. At Baku a single well is said sometimes to spout as much as 11,000 tons of oil in a single day, the oil rising perhaps to the height of 300 ft. It yields kerosene, paraffin, and paraffin oil, so extensively employed for illuminating purposes; also lubricating oil and vaseline; and has been largely employed as liquid fuel in factories, locomotives, and steamships. Steamers, specially constructed with tanks, are now engaged in its transport. The greatest and most remarkable development of the petroleum wealth began in 1859, when a company "struck oil" by boring at Oil Creek, Pa., and obtained a supply of 400 gallons a day. This led to numerous other borings, and the oil was obtained in such quantities that towns of considerable size soon sprang up in the oil district, railways were constructed, immense reservoirs were made, and long lines of oil pipes laid down, while large fortunes were realized. At first the borings were not very deep, and the oil generally flowed naturally; subsequently deeper borings were necessary, and the oil could only be raised to the surface by pumping. In 1900 the oil fields of Southern California came into prominence, and early in 1901 several large flowing wells or "gushers" were in operation in the region around Beaumont, Texas. The supply from the Texas field is sufficient to have a marked influence on the market. While the oil from these recently discovered fields is not suitable for illuminating purposes, it makes excellent fuel, and is much cheaper than coal in the localities where it is obtained. The Southern Pacific

## Phalanx

railway is now using the crude oil from the California wells in place of coal on its locomotives. The production of petroleum in the United States has continued to increase since 1859, when it was 2,000 barrels of 42 gallons each, until in 1900 it was 63,000,000 barrels. In 1900 there were 75 refineries in operation, having invested a capital of \$95,327,892, and giving employment to over 12,000 wage earners. About 40 per cent of the refined oil is exported.

**Pettie**, JOHN, R. A., distinguished painter, b. at Edinburgh in 1839; studied there at the Royal Scottish Academy; exhibited *The Prison Pet* (1859) at Edinburgh, and began in the following year to exhibit in London. Remarkable alike for vigorous conception and technical dexterity his historical and genre paintings have been numerous.

**Petu'nia**, a genus of American herbaceous plants, nat. order Solanaceæ, nearly allied to tobacco. They are much prized by horticulturists for the beauty of their flowers.



White Petunia.

**Pewter**, an alloy of tin and lead, or of tin with proportions of lead, zinc, bismuth, antimony, or copper, and used for domestic utensils. One of the finest sorts of pewter is composed of 100 parts of tin to 17 parts of antimony, while the common pewter of which beer mugs and other vessels are made consists of 4 parts of tin and 1 of lead. The kind of pewter of which teapots are made is an alloy of tin, brass, antimony, and bismuth.

**Phræda**, in Greek mythology, daughter of Minos, king of Crete, was the sister of Ariadne and wife of Theseus. She falsely accused her stepson, Hippolytus, of a criminal attempt upon her honor, an injustice of which she afterward repented, and was either killed by her husband or committed suicide. Sophocles and Euripides made this the subject of tragedies, and their example was followed by Racine.

**Pha'ëthôn**, a mythological character, who one day obtained leave from his father Helios (the Sun) to drive the chariot of the sun, but being unable to restrain the horses Zeus struck him with a thunderbolt and hurled him headlong into the river Po. The name in its English form of *Phæton* is applied to an open four wheeled carriage.

**Phal'anx**, a name given generally by the Greeks to the whole of the heavy armed infantry of an army, but more specifically to each of the grand divisions of that class of troops when formed in ranks and files close and

## Pharaoh

deep, with their shields joined and their pikes crossing each other. The Spartan phalanx was commonly 8 ft. deep, while the Theban phalanx was much deeper.

**Pharaoh** (fā' rō), the name given in the Bible to the kings of Egypt, corresponding to the P-RA or PH-RA of the Egyptian hieroglyphics, which signifies the sun. The identification of the Pharaohs mentioned in Scripture with the respective Egyptian kings, particularly the earlier ones, is a matter of great difficulty. See *Egypt*.

**Pharisees**, a religious sect among the Jews which had risen into great influence at the time of Christ, and played a prominent part in the events recorded in the New Testament. The most probable account of the origin of the Pharisees as a distinct sect is that, which refers it to the reaction against the attempt of Antiochus Epiphanes to break down the distinctions between his Jewish and his Greek subjects. At the time of Christ the Pharisees stood as the national party in politics and religion — the opponents of the Sadducees. The fundamental principle of the Pharisees was that of the existence of an oral law to complete and explain the written law. "Moses," says *Mishna*, "received the law (the unwritten law is meant) from Sinai, and delivered it to Joshua, and Joshua to the elders, and the elders to the prophets, and the prophets to the men of the Great Synagogue." This oral law declared the continuance of life after the death of the body, and the resurrection of the dead. This authoritative tradition received in process of time additions which were not pretended to be derived directly from Moses: 1, Decisions of the Great Synagogue by a majority of votes on disputed points. 2, Decrees made by prophets and wise men in different ages. 3, Legal decisions of proper ecclesiastical authorities on disputed questions. These authorities comprehended both the writers of the sacred books and their approved commentators. There is no doubt that though their strict observance of small points often led to hypocrisy and self-glorification, the sect contained a body of pious, learned, and patriotic men of progress.

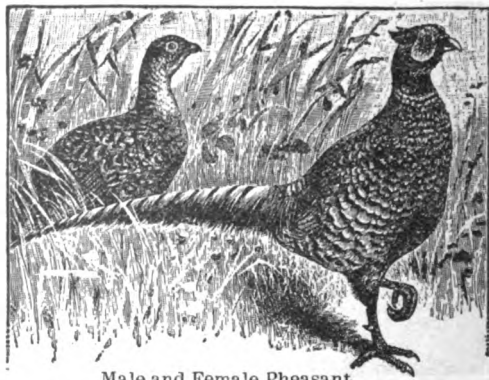
**Pharmacy** (Pharmaceutics), the art of preparing, compounding, and combining substances for medical purposes; the art of the apothecary. As these substances may be mineral, vegetable, or animal, theoretical pharmacy requires a knowledge of botany, zoology, and mineralogy; and as it is necessary to determine their properties, and the laws of their composition and decomposition, of chemistry also. In a narrower sense pharmacy is merely the art of compounding and mixing drugs according to the prescription of the physician. In pharmaceutical operations the apothecaries' weight is used, in which 20 grains make a scruple, 3 scruples a drachm, 8 drachms an ounce, and 12 ounces a pound; in fluid measure 60 minims (drops) make 1 fluid drachm, and 8 drachms a fluid ounce. The following abbreviations and signs are used by physicians in writing their prescriptions:  $\mathfrak{z}$ , ounce;  $\mathfrak{z}$ ,

## Phelps

drachm;  $\mathfrak{z}$ , scruple; f.  $\mathfrak{z}$ , fluid ounce; f.  $\mathfrak{z}$ , fluid drachm;  $\mathfrak{m}$ , minim; Gut. (*gutta*), drop; Coch. (*cochleare*), spoonful; j. or i., one; ss., half; āā or ana, of each; q. s. (*quantum sufficit*), as much as necessary; p. e., equal parts.

**Pharynx** (fa' ringks), the term applied to the muscular sac which intervenes between the cavity of the mouth and the narrow œsophagus with which it is continuous. It is of a funnel shape, and about 4 in. in length; the posterior nostrils open into it above the soft palate, while the larynx, with its lid, the epiglottis, is in front and below. The contraction of the pharynx transmits the food from the mouth to the œsophagus. From it proceed the eustachian tubes to the ears.

**Pheasant**, the general name given to birds which comprise several genera besides that of the pheasants proper. There are usually naked spaces of skin on the head or cheeks and often combs or wattles. The plumage of the males is brilliant, that of the females more sober, and the males carry spurs on the tarsometatarsus. The wings are short, the tail



Male and Female Pheasant.

long. The three front toes are united by a membrane up to the first joint, and the hinder toe is articulated to the tarsus. The food consists of grains, soft herbage, roots, and insects. They are chiefly terrestrial in habits, taking short rapid flights when alarmed. The pheasants are polygamous, the males and females consorting together during the breeding time, which occurs in spring. These birds breed freely in a domesticated state. The pheasant will interbreed with the common fowl, the Guinea fowl, and even with the black grouse, and there are white and pied varieties of the common species. The hybrid produced by the union of a cock pheasant with the common hen is termed a *pero*.

**Phelps**, ELIZABETH STUART, an American authoress, was b. Aug. 31, 1844, at Andover, Mass., the daughter of Prof. Austin Phelps and of the authoress of *Sunny Side*. Besides lecturing and engaging in work for the advancement of women and for social reforms, she has written a number of stories, including *The Gates Ajar* (1868), which passed through twenty editions in the year of its publication;

## Phidias

*Beyond the Gates* (1883); *The Gates Between* (1887); *Hedged In* and *The Silent Partner* (1870); *The Story of Avis* (1877); *Doctor Zay* (1884), in which the question of professional life for women is considered; and in 1890, in conjunction with her husband, the Rev. Herbert D. Ward, *Come Forth*, a travesty of the story of Lazarus, and *The Master of the Magicians*.

**Phidias** of ATHENS, a celebrated Greek sculptor, who was b. about 490 B.C., and flourished in the age of Pericles, but of whose life hardly any particulars are known. Among his works were three statues of Athena which were all in the Acropolis of Athens in the time of Pausanias. One colossal statue of Athena was in bronze, and the goddess was represented as a warrior goddess in the attitude of battle. The second and still more famous stood in the Parthenon, and was made of ivory and gold, representing Athena standing with a spear in one hand and an image of Victory in the other; it measured, with the pedestal, about 41½ ft. in height. The third statue, in bronze, of a smaller size, was called emphatically the *beautiful*, on account of its exquisite proportions. Another colossal statue by Phidias, that of Zeus at Olympia, was ranked for its beauty among the wonders of the world. Zeus was here seen sitting upon a throne, with an olive wreath of gold about his temples; the upper part of his body was naked; a wide mantle, covering the rest of it, hung down in the richest folds to his feet, which rested on a footstool. The naked parts of the statue were of ivory, the dress was of beaten gold. The right hand held a Victory, and the left a scepter tipped with the eagle. The Zeus was removed to Constantinople by Theodosius I, and was destroyed by fire in 475 A.D. During the government of Pericles, which lasted twenty years, Athens was adorned with costly temples, colonnades, and other works of art.

**Philadelphia**, Philadelphia co., Pa., on Delaware River, the chief city of Pennsylvania and the third of the U. S. Railroads: Pennsylvania; B. & O.; Philadelphia & Reading; and the Lehigh Valley. In the number and variety of its manufactures it is second only to New York, having over 18,000 establishments with an invested capital of \$375,000,000, employing over 260,000 hands. Among the more prominent industries may be mentioned the locomotive works, carpet works, cotton mills, sugar refineries sending out 20,000 barrels per day, chemical works and oil refineries; iron and steel products to the amount of \$75,000,000 employ 40,000 hands. Philadelphia is the greatest textile center in the U. S. The total area of the city is about 130 sq. m., only one-eighth of which is thickly built, the remainder comprising the small suburban towns within the city limits. Philadelphia is noted as the city of homes, and has more single residences than any other city in the world. The buildings in the older portion of the city are very plain architecturally, but are now relieved by the magnificent City Hall and other modern buildings, among which may be mentioned the Customhouse, the U. S.

## Phillip II

mint, and the Masonic Temple. Philadelphia is noted for its educational advantages, spending nearly \$4,000,000 yearly on its public schools. There are many professional schools and colleges, including law and medical schools. The University of Pennsylvania, founded in 1755, is located here. It has over 2,000 students. Another institution worthy of note is Drexel Institute, with an endowment of \$1,000,000. The city is rich in special and reference libraries, the most important being the Pennsylvania Historical Society. There are many parks scattered throughout the city, the largest being Fairmount Park with 3,000 acres. The Centennial Exposition of 1876 was held in this park. Population, 1900, 1,293,697.

**Philæ**, a small island of the Nile, on the borders of Nubia and Egypt, just above the first cataract, 5 mi. s. of Assouan. It contains some remarkable ruins, among which are temples, obelisks, etc. The most ancient of the temples was erected by Nectanebus I, the last of the native Pharaohs, about 378-360 B.C. There is also a great temple to Isis, built by Ptolemy II, Ptolemy III, and Euergetes, 247-222 B.C. Others are of the times of the Ptolemies and Cæsars.

**Phillip**, one of the twelve apostles, according to John's gospel, of Bethsaida, the city of Andrew and Peter, and who was called to follow Jesus at Bethany. After the resurrection he was present at the election of Matthias to the apostleship, but is not again mentioned. In the Western church he is commemorated on May 1. **PHILIP**, the Evangelist, often confounded with the above, is first mentioned in Acts 6:5. He preached at Smyrna, where Simon Magus was one of his converts; baptized the Ethiopian eunuch; entertained Paul and his companion on their way to Jerusalem, when "he had four daughters which did prophesy."

**Phillip II** (382-336 B.C.), king of Macedon, the most famous of the five Macedonian kings of this name, was a son of Amyntas II. He succeeded his elder brother Perdiccas in 360. His position at first was not very secure, but as he had few scruples and was a man of the highest talents both for war and diplomacy, in a short time he had firmly established himself, had reorganized the Macedonian army, and proceeded to extend his sway beyond his own kingdom. The terror of his name provoked the *Philippics* of Demosthenes, who endeavored to rouse the people of Athens to form a general league of the Greeks against him; but by 346 he was master of the Phocian cities and of the pass of Thermopylæ, and as general to the Amphictyon council he was the crowned protector of the Grecian faith. In the spirit proper to his office he marched into Greece to punish the Locrians for an act of profanity; but instead he seized the city of Elatea, and began to fortify it. Demosthenes now exerted all his eloquence and statesmanship to rouse the ancient spirit of Grecian independence, and a powerful army was soon in the field, but being without able or patriotic commanders it was defeated at the decisive battle of Chæroneia



## Philip I

in August, 338 B.C. After this last struggle for freedom Philip was acknowledged chief of the whole Hellenic world, and at a congress held at Corinth he was appointed commander of the Greek forces, and was to organize an expedition against Persia. While preparing for this enterprise he was murdered.

**Philip I** (1052-1108), king of France, son of Henry I, succeeded to the throne under the guardianship of Baldwin V, count of Flanders, in 1060. The Norman conquest of England took place in his reign, and he supported Prince Robert, son of the Conqueror, in his revolt against his father. He was a worthless debauchee and was detested by his subjects.

**Philip II** (1165-1223), **AUGUSTUS**, king of France, was crowned as successor during the lifetime of his father Louis VII, whom he succeeded in 1180. One of his first measures was the banishment of the Jews from the kingdom, and the confiscation of their property. He invaded Normandy during Richard's captivity (1193), confiscated the possessions of King John in France after the death of Prince Arthur (1203), prepared to invade England at the instance of the pope (1213), turned his arms against Flanders and gained the celebrated battle of Bouvines (1214).

**Philip III** (1245-1285), called the *Hardy*, king of France, was the son of Louis IX and Margaret of Provence. He succeeded his father 1270. In 1271 he possessed himself of Toulouse on the death of his uncle Alphonso; in 1272 he repressed the revolt of Roger, count of Foix, and in 1276 sustained a war against Alphonso X, king of Castile. The invasion of Sicily by Peter of Aragon, and the massacre of the French, known as the "Sicilian vespers," caused him to make war against that prince, in the course of which he died.

**Philip IV** (1268-1314), king of France, succeeded his father in 1285. He had already married Joanna, queen of Navarre, by which alliance he added Champagne as well as Navarre to the royal domain, which he made it his policy still further to increase at the expense of the great vassals. He was long engaged in war with Flanders, which resulted in the accession of the Walloon territory to France, and the restoration of the rest of Flanders to its count on condition of feudal homage. Philip left numerous ordinances for the administration of the kingdom, which mark the decline of feudalism and the growth of the royal power. He also convoked and consulted the states general for the first time.

**Philip VI** (1293-1350), of **VALOIS**, king of France. He succeeded to the crown in 1328. In his reign occurred the wars with Edward III of England, who claimed the French crown as grandson, by his mother, of Philip IV. His reign was unfortunate for France by the long war which it inaugurated, known in France as the Hundred Years' War; and he has left an evil memory by his persecutions of Jews and heretics, his confiscations, and exactions.

**Philip II** (1527-1598), of Spain, was the son of Charles V and Isabella of Portugal. He was married in succession to the Princess Mary

## Philip I

of Portugal 1543, and to Mary of England in 1554, the same year in which he became king of Naples and Sicily by the abdication of his father. In 1555 his father resolved to abdicate the sovereignty of the Netherlands in Philip's favor; and in 1556 he received the crown of Spain, with its possessions in Asia, Africa, and America. His first act was to propose a truce with France, which was broken almost as soon as concluded. In 1556 he went to England, where he was refused the ceremony of a coronation and the troops that he demanded in aid of his war with France. These, however, were at length conceded to him by Mary. In 1559 the French War was concluded and the marriage of Philip to Elizabeth of France took place. In 1566 the revolt of the Netherlands commenced, which ended in the separation of the seven northern provinces from the crown of Spain, and their formation into the Dutch Republic. This struggle lasted about thirty years, till the close of Philip's reign. In 1571 the Archduchess Anne of Austria became his fourth wife. In 1580 his troops under Alva subdued Portugal, of which, and all its dependencies, Philip now became sovereign. In 1586 Philip declared war with England. The year 1588 saw the destruction of the Armada and the descent of Spain from her position as a first-class power in Europe. The remainder of his reign was occupied with war and intrigues with France, but in 1598 the Peace of Vervins was concluded. Philip showed some disposition at the same time to make peace with England and the Netherlands, but his offers were not accepted.

**Philip V** (1683-1746), of Spain, the first Spanish king of the Bourbon dynasty, was b. at Versailles. He succeeded to the crown of Spain by the will of Charles II, who d. without direct heirs. On the death of Charles in 1700, he was immediately proclaimed king, and was generally recognized in Spain, Naples, and the Netherlands; but the succession was contested by the Archduke Charles of Austria, whose claim was enforced by the armies of England, Holland, and Austria in the wars of the Spanish Succession, which began in 1702. By the Treaty of Utrecht (1713) he was recognized as king of Spain, but Gibraltar was lost to Spain, Minorca was also ceded to England, Sicily to Savoy, the Netherlands, Naples, and the Milanese to Austria. He married Elizabeth Farnese, niece of the Duke of Parma, in 1714, and Alberoni, the minister of the Duke of Parma in Spain, became prime minister. In 1724 Philip resigned the crown of Spain in favor of his son Don Louis, but the death of Louis a few months later induced him to resume the royal power. He d. after a reign of forty-six years.

**Philip I** (The Magnanimous) (1504-1567), landgrave of Hesse. He began to reign at the age of fourteen, and introduced the Lutheran religion into Hesse in 1526. In 1527 he founded the University of Marburg, subscribed the protestation to the Diet of Spire in 1529, submitted the confession of faith at Augsburg in 1530, and in 1531 formed with the Protest-

## Philippine Islands.

ant princes the Schmalkalden League. He was forced to submit to Charles V in 1547, who kept him a prisoner for five years.

**Philippine Islands**, a large group of islands in the northern part of the Malayan Archipelago. They lie northeast of Borneo and east of French Indo-China, and are bounded on the north and west by the China Sea, on the east by the Pacific Ocean, and on the south by the Sea of Celebes. There are in the group about 1,600 islands, most of which are very small. The largest is Mindanao, with an area of 45,559 square miles. Luzon, the most important of the group, has an area of 43,075 square miles. The only other islands of geographical importance are Samar, Negros, Panay, Palawan, Mindoro, Leyte, Cebu, Bohol and Masbate. The area of the total land surface is nearly 128,000 square miles.

**Surface and Climate.**—The surface is mainly rugged and hilly, showing volcanic origin. The coasts are deeply indented. Earthquakes are frequent and destructive. The soil is fertile and is covered with a luxuriant growth of tropical vegetation. The climate is tropical, characterized by heavy rainfall due to the position and elevation of the islands. Only two seasons are recognized, the wet season from June to October, and the dry season covering the rest of the year. From July to October terrible cyclones, known as typhoons, frequently occur, sometimes causing great loss of life and property. On the whole the climate is not unhealthful for the natives, but Europeans and Americans find difficulty in accustoming themselves to its peculiarities.

**Population.**—The native inhabitants, called Filipinos, are of two races—the Negrito and the Malay. The former are savages. They are small in stature, with closely curled hair, yellow skin and white teeth, which they file. The average height of a Negrito is about 58 inches. The Malays are taller, averaging 59 inches in height. Their bodies are meager but sturdily built and of a dark brown color. The remainder of the population consists mainly of Chinese, Japanese and mixed races. The number of Europeans is comparatively small, most of them residing in the city of Manila. The Filipinos have attained a form of civilization fairly comparable with, and in some respects in advance of, that on the continent adjacent. The native dress consists of an article of headgear combining the functions of hat and umbrella, and a rain-cloak varying in form and material in the different islands. The typical Philippine house is built with reference to its use during the rainy season. The structure of bamboo and palm leaves rests on four or more heavy timbers set into the ground so that the floor is raised five or ten feet above the surface, allowing the breeze to blow through and keep the ground dry. In the better class of houses, corrugated iron is used for roofing and big flat oyster shells for windows. According to the latest government estimate the total population is 6,975,073. The largest city is Manila, with a population of 221,000 (1903).

**Government.**—The executive power of the

## Philippine Islands

Philippines is vested in a Governor, Vice-Governor and the Philippine Commission consisting of five Americans and three Filipinos. The present Governor is General Luke E. Wright. A legislative assembly has been provided for, consisting of two chambers, the Philippine Commission constituting the Upper House, while the Lower House is to consist of from fifty to one hundred popularly elected delegates, apportioned among the provinces on the basis of population, except that each province shall be entitled to one member. To be qualified to vote for delegates a person must have held office under the Spanish regime; or own property to the value of \$250, or pay taxes amounting to \$15 or over; or speak, read and write Spanish or English. The Legislature is to hold annual sessions; its delegates are chosen biennially. If at any session it refuses to vote the necessary supplies for the support of the Government, the Governor may appropriate for that purpose a sum equal to the amount last appropriated. Every two years the Legislature is to choose two resident commissioners to the United States. Congress reserves the power to annul all laws passed by the Philippine Legislature. To the Bureau of Insular Affairs, instituted by the U. S. War Department, are committed all matters pertaining to the civil government, subject to the jurisdiction of the War Department. The Philippine Commission is required to make annual reports to the Secretary of War, of all receipts and expenditures of the Philippine Government. Local government has been instituted in most of the towns, each being formed into a municipality with a President, Vice-President and Council chosen for two years by qualified electors.

The judicial system comprises a Supreme Court consisting of seven justices, four American and three Filipino; sixteen courts of First Instance, presided over by native judges, and municipal criminal courts under justices of the peace. The United States Supreme Court is given appellate jurisdiction over all judgments of the Philippine Supreme Court involving more than \$25,000, and over all cases where the Constitution, the laws, or any right or title claimed under the authority of the United States are in question. The justices of the Insular Supreme Court, as well as the Governor, Vice-Governor and the members of the Philippine Commission, are appointed by the President of the United States, with the advice and consent of the Senate.

**Industries.**—Agriculture is the chief industry of the Philippines. The staple products, in order of their importance, are Manila hemp, tobacco, sugar, coffee and rice. Among other products are maize, wheat, indigo, cocoanuts, sesame, peanuts and many varieties of vegetables. The fruits, both wild and cultivated, are superior in quality and abundant in variety. The mango under cultivation is finer than in any other country. Some of the islands, as Masbate, have comparatively little tilled ground, and depend more largely on live-stock. Carabaos, horses and cattle are raised exten-

## Philippine Islands

sively in Masbate, and swine and fowls abound in every native settlement. The methods of farming are, however, still comparatively primitive. The seven Government experiment stations in the Philippines are actively engaged in introducing modern farm machinery and improved methods of farming. The Government distributes seeds and is giving special attention to the cultivation of forage plants and to improved methods of growing coffee and rice. Most of the vegetables of the United States, except white potatoes and melons, are being successfully grown in the Philippines.

The most important manufactures are tobacco products. The chief center of their manufacture is Manila. The natives show great artistic skill in weaving fabrics of pina fiber, Manila hemp, wool, cotton and silk, and in making mats, hats, bags and many other articles of bamboo, rattan and palm leaves. They are also skillful in metal work and wood-carving. The forests are rich in ebony and other hard woods used in this work.

The mineral resources are supposed to be extensive, though their extent is not yet known. Thus far the chief mineral product is a highly carbonized lignite, which makes a very good substitute for true coal. It is widely distributed over the archipelago, but is now chiefly mined in Cebu. Gold is found in many localities and has long been mined by the natives. At present the prospects of gold mining in Luzon are very favorable. Copper, iron, silver and lead have been discovered, but have not yet been mined to any extent.

**Commerce and Finance.**—The exports consist mainly of agricultural products, while the imports are chiefly manufactured articles. Trade relations with foreign countries have grown rapidly since peace was restored in the islands, as the following table shows:

	1900	1904*
Exports .....	\$19,751,068	\$29,045,778
Imports .....	20,601,436	31,129,192

\*These figures are for eleven months of the fiscal year which ended June 30, 1904.

The foreign trade is chiefly with Great Britain, on account of its large purchases of Manila hemp and its great sales of cotton cloth. But since 1900, the trade between the Philippines and the United States has steadily increased. During the first eleven months of the fiscal year which ended June 30, 1904, the exports to the United States amounted to \$11,545,211, and the imports from the United States amounted to \$4,397,799. Manila hemp is the principal article exported to the United States, while the United States supplies more of the food stuffs used in the Philippines (except rice) than any other country. The central Government is supported chiefly by import and export duties. The coinage in use comprises the Mexican silver dollar, and silver peso and fractional currency coined at the Manila mint.

## Philippine Islands

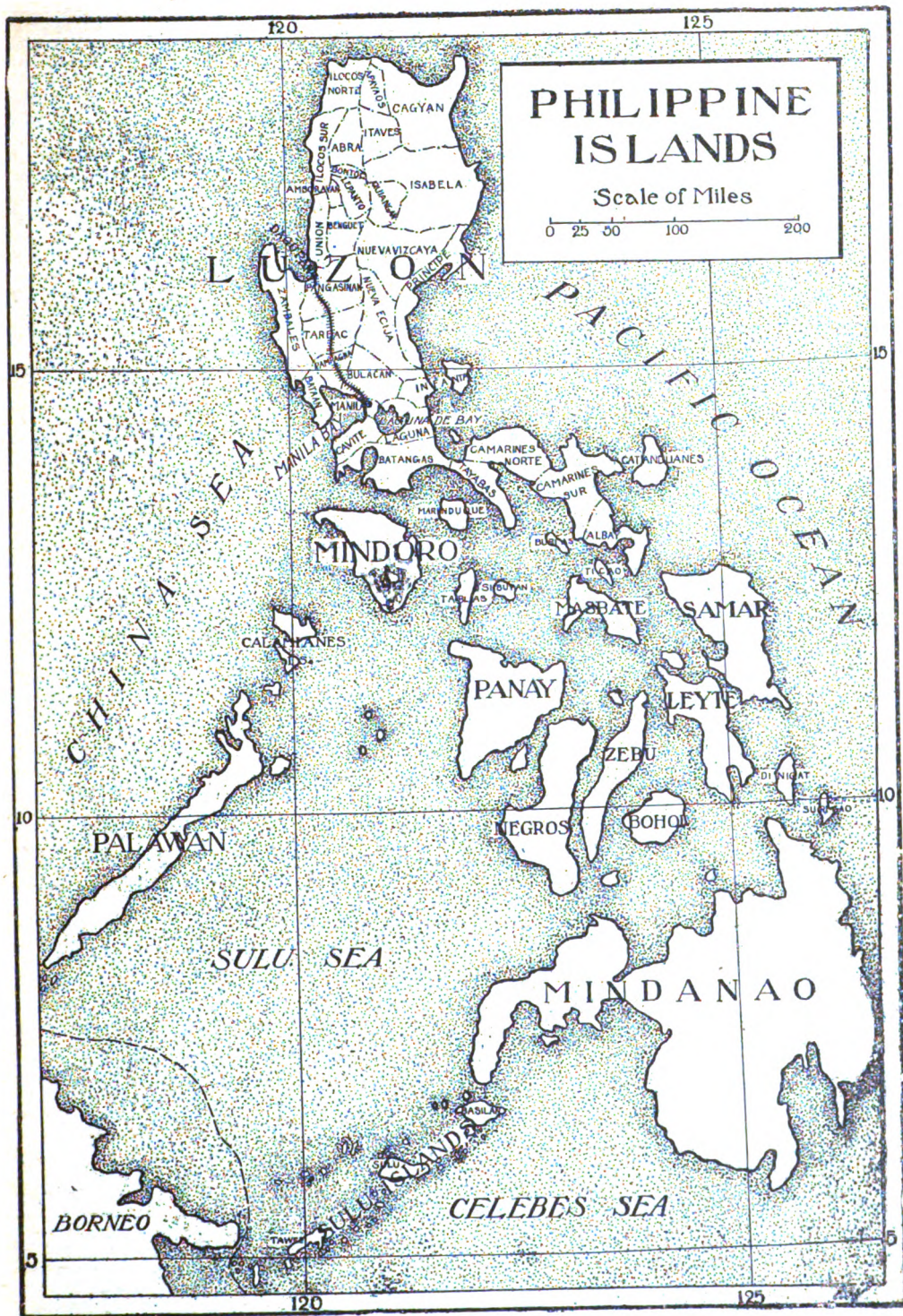
**Communication.**—As the Philippine Islands still lack railroads and have but few roads of any description, they are dependent upon the coasting trade for their domestic commerce. As large ships are compelled to anchor about two miles from the shore of Manila, the principal port, the foreign trade is also dependent on the small boats. The Government intends to dredge an inshore harbor and protect it by breakwaters so that the largest vessels may enter its docks. Commerce is much hampered by the poor inland communications and the lack of American merchant and passenger vessels between San Francisco and the Philippines. Telegraph lines connect most parts of the archipelago, and in 1903 electrical communication with the U. S. was opened up by means of the American Pacific Cable.

**Education.**—Before the arrival of the Americans in the Philippines, the public elementary school system required by Spanish law was widely diffused over the archipelago and higher education was well provided for. But the provisions for primary and secondary education were largely neglected, and the tendency was to center efforts upon the college and university. The school system devised and put in operation by the new administration is now thoroughly inaugurated and organized all over the islands. The archipelago is divided into seventeen educational divisions, with an American superintendent over each division. There are now in the islands over 1,300 American teachers who are coöperating with the native teachers, more than 3,000 in number, in the education of the masses. The chief aims of the common schools at present are the wide-spread dissemination of knowledge, especially in regard to the American language, institutions and ideals, and the practical agricultural and industrial training of the Filipinos. In these schools over 25,000 children and adults are learning to read, write and speak English. It has been necessary to establish night schools to accommodate the large numbers who apply for admission to the public schools. Permanent normal schools and vacation normal courses for the training of native teachers have been organized, and the establishment of technical schools, new schools of art and music, and a new university at Manila are contemplated.

**Religion.**—The civilized Filipinos are mainly Roman Catholics. The Moros living in the south and the wild tribes of the mountains are chiefly pagans. Hitherto, most of the parishes have been administered by Spanish friars, but the majority of them have now given up their parishes, and their places are being supplied by American priests as rapidly as is practicable. The work of the Church is now being ably directed by four American bishops, Archbishop Harty, and Bishops Rooker, Dougherty and Hendricks. Owing to the opposition to foreign clergy and the present scarcity of priests, the task which these fathers have before them is tremendous, but their piety, zeal and tactful policy have already accomplished much.

**History.**—The Philippine Islands were discovered in 1521 by Magellan. In 1542 a Spanish







## Philippine Islands

expedition was sent to the islands under Villalobos, who gave the group the name of *Islas Felipinas* in honor of Prince Philip, later King Philip of Spain. The permanent conquest of the islands was achieved by an expedition from Mexico under Legaspi. In 1570 Luzon was conquered and in June, 1571, the city of Manila was founded and became at once the seat of Spanish power in the islands. The dominating impulse in the extension of Spanish power over the Philippines had been religious rather than commercial. The aim of the Church was to make the islands an outpost of Christianity, from which the missionaries could prosecute effectively their labors in China and Japan. For over three centuries the Christian population steadily increased, and the people were happy in their obedience to the requirements of their faith. Schools and colleges were provided, the native languages were given literary form and translations made of devotional literature. The artistic instincts of the Filipinos were developed and some of the natives gained distinction in painting and literature. The petty governors and headmen were Filipinos, while the higher administrative officers were Spaniards. No Spaniards were allowed to live in the mission villages except the friars, who exercised there a firm but ordinarily gentle sway. The economic development of the islands was rendered impossible by the Spanish manufacturers, who secured the restriction of the imports from the Philippines to an annual shipload. During the course of time, by cession from the government, by legacy, by purchase, by occupation and by other means, the Spanish friars obtained possession of about 400,000 acres of the best agricultural lands in the Philippines. Some of these lands were worked directly under the supervision of the friars, but the greater part were leased to between 60,000 and 70,000 tenants. Gradually the happy relations between the friars and the Filipinos changed. In the islands and elsewhere opinions differ as to the cause of this change, and also as to the extent of the opposition to the friars. Some assert that they became obnoxious to a large part of the people, owing to the heavy contributions they are said to have levied for the support of the Church, and owing to their having acquired so much land, much of it by dispossessing the owners on the pretext of exacting the Church's dues. Others vigorously maintained that the unpopularity of the friars was only with a faction of the natives and sprang almost wholly from political motives, owing to the friars being the administrators of the Spanish government in the land, with a power almost absolute. However this may be, though the people in general remained good Catholics, loyal to the Church, there grew up among them a widespread distrust for, and hatred of the friars. This condition of things was the cause of many insurrections during the past century. In 1872, a learned Filipino priest named Joseph Burgos organized a movement to exclude the Spanish friars from parish duties, and demanding that native clergymen be given the care of souls.

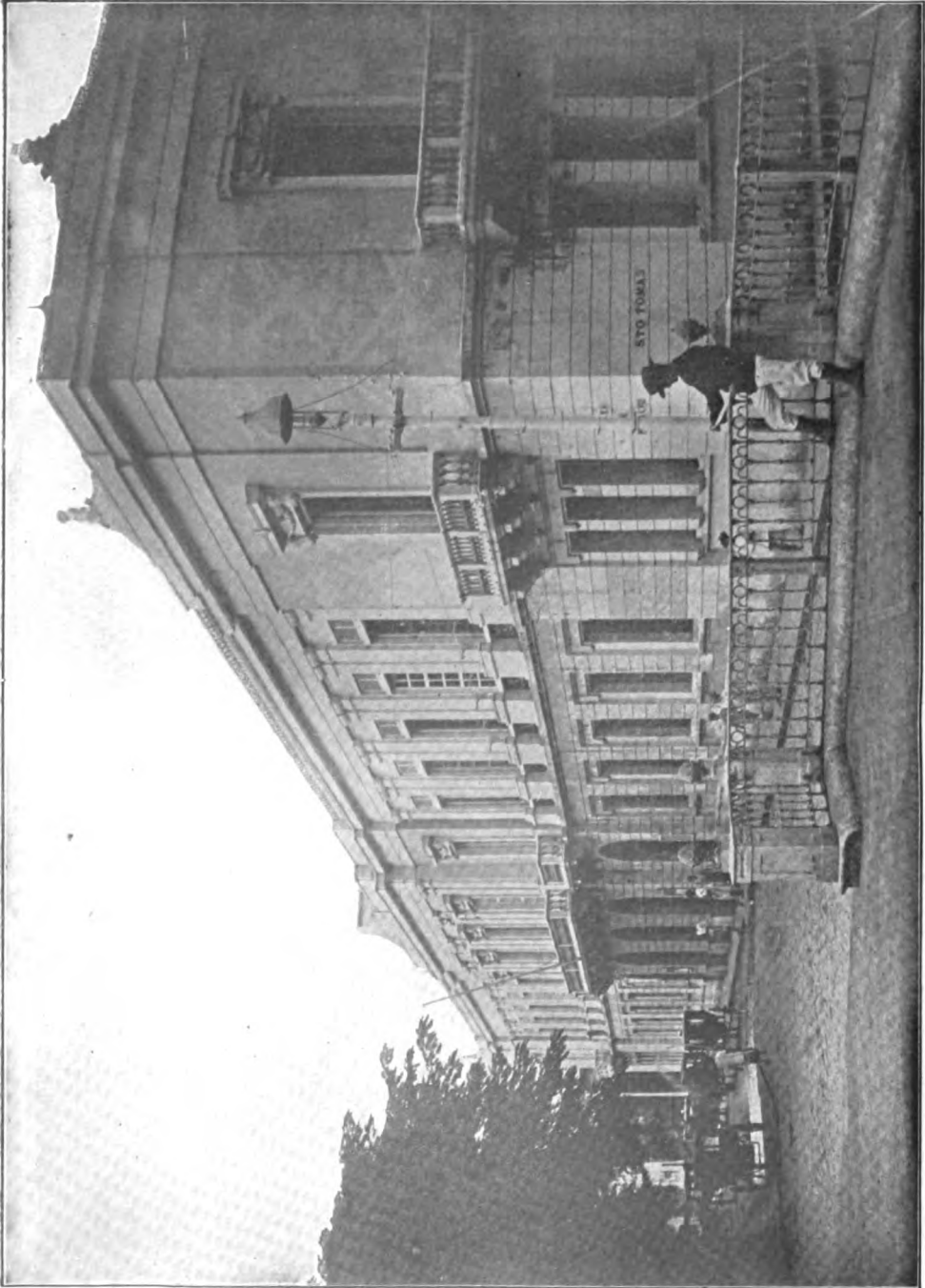
## Philippine Islands

The result was that Dr. Burgos and three other native priests who had joined him in the movement were executed on the Luneta and an outbreak of the natives followed. The last rebellion against the friars broke out in 1896, when Dr. Rizal, a favorite Filipino poet and physician, was executed by their influence. Dr. Rizal had incurred the hatred of the authorities by founding the *Liga Filipina*, to work for the expulsion of the friars and to secure political concessions for the islands. This insurrection centered in the province of Cavité and its leader was Emilio Aguinaldo (which see). In December, 1897, a treaty was made between Aguinaldo and Governor-General Primo de Rivera. According to its terms, important concessions were to be made to the natives and a certain sum of money paid to the leaders, who were to cease hostilities and leave the country. Peace was thus restored for a short time, but in March, 1898, the rebellion broke out afresh, and the Seventy-fourth Regiment of native soldiers in Spanish service deserted to the insurgents, who now outnumbered the Spanish forces. On the day that war began between the U. S. and Spain, Aguinaldo appeared in Singapore and in a conference with Dewey arranged to follow him to Manila, and act with him against Spain for the liberation of the Filipinos from her rule. On May 1, 1898, the Spanish fleet in the Bay of Manila was annihilated by the Asiatic squadron under Commodore Dewey. As he had not enough men to control the city of Manila at that time, no attack was made upon it, but the Government proceeded at once to fit out several army expeditions for the Philippines. Meanwhile Aguinaldo had arrived at Cavité and had an interview with Dewey, who supplied him with arms for the insurgents who flocked to his standard, thinking that the United States would pursue in the Philippines the policy proposed for Cuba. In the weeks that elapsed before the arrival of the American troops, the insurgent forces invested Manila from the northern and eastern sides. Late in July Gen. Merritt reached Manila with over 600 officers and 15,000 men. On the fifteenth of August, after a brief assault, and with but little loss of life, the capital surrendered unconditionally to the Americans. In a treaty signed December 10, 1898, Spain ceded the whole group of islands to the United States, and the United States agreed to pay Spain \$20,000,000, give Spanish ships and merchandise admission to the islands on the same terms accorded to American ships and goods for a period of ten years, and to transport to Spain the Spanish soldiers captured at the surrender of Manila. This treaty was ratified by the Senate, Feb. 6, 1899.

Meanwhile Aguinaldo, anticipating the coming investment of Manila by the Americans, had organized a native government and in a provisional constitution promulgated June 23, 1899, announced the independence of the islands as the chief object of the revolutionary government. In July he addressed an appeal to the Powers for the recognition of Filipino independence, and in August was made presi-

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## Philippine Languages

dent of the Filipinos. During the following months the Americans held Manila, and the forces of Aguinaldo the rest of the island. When President McKinley's proclamation that the islands had been ceded to the U. S., and that military rule would be established over them as soon as possible, reached the Philippines, relations became greatly strained between the insurgents and the American forces. Finally on Feb. 4, 1899, Aguinaldo assumed the defensive against the United States, beginning operations by an attack on Manila, in which he was, however, unsuccessful. Previous to this attack, a Commission had been appointed by President McKinley to investigate conditions in the islands, and to labor for the acceptance of American rule by the Filipinos. The Commission began its work in March, 1899. Its efforts were devoted particularly to conciliating prominent Filipinos, and to building up a party favorable to American rule. Meanwhile, fighting continued between the Americans and the forces of Aguinaldo. During the first nine months the Americans made but little headway, but in the fall and winter their progress was more rapid. Finally, the native troops were so hard pressed by the Americans that Aguinaldo, after repeatedly removing his capital, was compelled to flee to the mountains. Here the fighting was continued with varying success until March 23, 1901, when Aguinaldo was captured at Palawan, in the province of Isabella, Luzon, and brought to Manila, where on April 2, 1901, he formally took the oath of allegiance to the U. S. On July 4th, military government was superseded by civil government in the pacified districts, and by act of Congress, approved July 1, 1902, civil government was established throughout the islands. The Friar Land question was settled in 1902. Governor Taft, through negotiations with the Vatican and the representatives of the various orders, succeeded in buying these lands for about \$7,000,000. It is the purpose of the government to resell the friar lands in small holdings, giving preference to the present occupants, at a price that will nearly cover the cost of the purchase (See subhead *Religion* above). According to the census taken in 1903 the population was 6,976,574. Governor Luke E. Wright, the present governor, successor of Governor Taft, was appointed in 1904.

**Philippine Languages.**—There are numerous dialects spoken in the Philippine Islands. Those of the Malays form a closely connected group and apparently differ considerably from the Negrito dialects, though they are similar in sound. But little is known of the language of the Negritos, who live in scattered tribes in the interior of most of the large islands. Among the languages of the Malay race, which constitutes the bulk of the population, several, such as the *Tagalog* of Manila and the coast of Mindoro, and the *Bisayan* of the Bisayan Islands and the North and East Mindanao, have reached a high state of development.

The vocabularies of the Philippine languages

## Phillips

contain several foreign elements. Many of the dialects have borrowed a number of Sanskrit words, and the languages of the Christian tribes contain words of Spanish derivation, while Arabic words have crept into the Mohammedan dialects. The alphabets in which the native languages are written are also due to these foreign influences. The native alphabets, which are no longer used except by the Tagbanuas of Palawan and the Mangians of Mindoro, were probably derived from India. The sounds of the letters are in the main similar to those of the English language. The sounds peculiar to the Filipinos are the guttural-nasal *ng* and the phonetic modification of *d*, producing a characteristic *r*-sound. A prominent characteristic of the Filipino dialects is the use of particles to accomplish derivation. These particles are usually employed as prefixes, though there are also a few suffixes and infixes. There is no distinction of gender and practically no inflexion to denote person, number or case in verbs or nouns; in pronouns, however, there is a species of inflexion to indicate case. Other peculiar features of the language are the frequent use of the passive construction and the fewness of prepositions.

**Phil-ip-pop'olis**, a city of Bulgaria situated in a broad, fertile plain at the head of Maritza River, on the railroad between Constantinople and Sofia. It is 80 miles southeast of Sofia and ranks next to that city in size. In ancient times it was an important Thracian city. It was almost wholly destroyed by an earthquake in 1818 and was ravaged by fire in 1846, but owing to its excellent trade facilities recovered rapidly each time. The city is the chief commercial center of Southern Bulgaria, having an active trade in its manufactures of silk and cotton fabrics and attar of roses, as well as in rice, grain, tobacco and hides. Of recent years it has been much enlarged and beautified and is a favorite home of wealthy Greeks and Bulgarians. Pop. 1900, 42,849.

**Phillis'tines**, the name of a Semitic people or race who inhabited the southern part of the lowlands of Palestine, from the coast near Joppa to the Egyptian desert south of Gaza. They occupied five chief cities (Ashdod, Gaza, Gath, Askelon, Ekron), and these formed a kind of confederacy under five lords or chiefs.

**Phillips, WENDELL** (1811-1884), abolitionist, was b. at Boston, Mass., the son of the first mayor of the city (1822). He graduated at Harvard with Motley in 1831, studied law there, and was called to the bar in 1834. But before clients came he had been drawn away from his profession to the real work of his life. A timely and important speech in Faneuil Hall in 1837 made him at once the principal orator of the antislavery party; and henceforth, until the president's proclamation of Jan. 1, 1863, he was Garrison's loyal and valued ally, his lectures and addresses doing more for their cause than can well be estimated. He also championed the cause of temperance, and that of women, and advocated the rights of the Indians. In 1870 he was nominated for governor by the Prohibitionists and the labor

## Phillipsburg

party. His speeches and letters were collected in 1863.

**Phillipsburg**, Warren co., N. J., on Delaware River. Railroads: New Jersey Central; Pennsylvania; D. L. & W.; and Lehigh Valley. Industries include extensive iron works, rolling mills, locomotive, boiler, and machine works, and a large mower and reaper manufactory. It is in a limestone, agricultural, and iron ore region. Pop. 1900, 10,052.

**Philology** (or comparative philology), a term commonly used as an equivalent to the science of language, otherwise called *Linguistic Science*, or *Linguistics*. This science treats of language as a whole, of its nature and origin, etc., and of the different languages of the world in their general features, attempting to classify and arrange them according to such general features, and to settle in what relationship each stands to the others. The philologist as such does not study languages for practical purposes, or to be able to read and speak a number of them, though the more he is tolerably familiar with the better. He rather studies them in the way a naturalist studies a series of animals or plants, as if they were separate organisms each with a life and growth of its own. That every language has such a life and growth is true in a sense, for languages are continually in a state of change; yet a language is not to be regarded as an organism like a plant or an animal, but rather, to quote Professor Whitney, as an *institution*, an outcome of the needs of human beings for communication with their fellows. A language is a system of vocal sounds through which ideas are conveyed from person to person in virtue of the fact that certain ideas are attached or belong to certain sounds by a sort of convention or general understanding existing among those who use the language. That there is any natural law by which one idea belongs to one vocal sound rather than to another can hardly be affirmed in view of the fact that if we select any one idea we shall find that each of the thousand languages of the world expresses this idea by a different sound or group of sounds. Indeed, ideas can be conveyed otherwise than by vocal sounds, as witness the elaborate sign language that has been developed in some communities, as also the finger language of the deaf and dumb. We can even conceive that a language of hieroglyphics or written symbols might exist with no spoken language alongside of it. We have, however, no knowledge of any such case, and, in fact, wherever man exists we find him making use of speech, which, indeed, is one of his most distinct and marked characteristics. As to the origin of language nothing is really known, although most probably it is an invention or acquisition of the human race, and not an original endowment. Any one, however, may believe if he pleases that man was created with a language and the faculty of making use of it already in his possession. If the other view is taken we must suppose that the earliest men had no language to start with, but that having suitable organs for speech

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they devised a language among themselves as a means of intercommunication, and we may conclude that the earliest attempts at speech were either in imitation of the different sounds heard in nature, or that they were based on the inarticulate utterances or cries by which human beings naturally gave vent to different emotions. But however language originally arose, it is very certain that whatever language we speak has to be acquired from others who have already learned to speak it, and that those others have similarly acquired it from their predecessors, and so on backward into the darkness of the remotest ages. Every language is thus at our birth a foreign language to all of us.

The science of philology is quite of modern origin, being hardly, if at all, older than the present century. Speculations on language and its nature were indulged in by the ancient Greeks; but as the Greeks knew little or nothing of any language but their own they had not sufficient materials wherewith to construct a science of language. In later times materials became more abundant as scholars studied Hebrew, Greek, Latin, Arabic, etc.; but it was the introduction of Sanskrit to the Western world, and its observed similarity in many respects to Greek that led to the establishment of philology on a true scientific basis, an achievement which was largely due to the labors of Bopp, Pott, Schleicher, and other German scholars. Yet though most valuable results have been attained and a large number of languages have been studied and classified, much remains to be done, much remains uncertain and must always remain so. One great difficulty that the philologist has to grapple with is the want of historical documents to throw light on the history of the great majority of languages, as only a very few possess a literature dating from before the Christian era, and far the greater number have no literature at all.

To begin with our own language and the kindred tongues. Philology has succeeded in showing that the English language is one of a group of closely allied languages which are known by the general name of the Teutonic or Germanic tongues. The other languages of the group, some of which are more closely connected with English than the rest, are Dutch, German, Danish, Icelandic or Old Norse, Swedish, and Gothic; to which may be added, as of less importance and having more the character of dialects, Norwegian, Frisian, the Plattdeutsch or Low German of Northern Germany, and Flemish, which differs little from Dutch. The Teutonic tongues are often divided into three sections, based on closeness of relationship: the *High German*, of which the modern classical German is the representative; the *Low German*, including English, Dutch, Frisian, Plattdeutsch, and Gothic; and the *Scandinavian*, including Danish, Swedish, and Icelandic. Another division is into *East Germanic*, including Gothic and Scandinavian; and *West Germanic*, including the others.



The evidence that all these languages are closely akin is to be found in the great number of words that they possess in common, in the similarity of their structure, their inflections, their manner of compounding words—in short, in their family likeness. This likeness can only be accounted for by supposing that these languages are all descended from one common language, the primitive Teutonic, which must have been spoken at a remote period by the ancestors of the present Teutonic peoples, there being then only one Teutonic people as well as one Teutonic tongue. In their earliest form, therefore, and when they began to be differentiated, these languages must have had the character of mere dialects, and it is only in so far as each has had a history and literature of its own that they have attained the rank of independent languages.

The rise of dialects is a well-known phenomenon, taking its origin in the perpetual change to which all languages are subject. A language that comes to be spoken over a considerable area and by a considerable number of persons—more especially when not yet to some extent fixed by writing and literature—is sure to develop dialects, and each of these may in course of time become unintelligible to the persons using the others, if the respective speakers have little intercourse with each other, being separated by mountain ranges, arms of the sea, or merely by distance. In this way is the existence of the different Teutonic tongues to be accounted for. A similar instance of several languages arising from one is seen in the case of Italian, French, Spanish, and Portuguese, all of which are descended from the Latin. Of the common origin of these we have, of course, direct and abundant evidence.

The Teutonic tongues, with the primitive or parent Teutonic from which they are descended, have been proved by the investigations of philologists to belong to a wider group or family of tongues, which has received the name of the Aryan, Indo-European, or (especially in Germany) Indo-Germanic family. The chief members of this family are the Teutonic, Slavonic (Polish, Russian, Bohemian), Lithuanian, Celtic (Welsh, Irish, Gaelic, etc.), Latin (or Italic), Greek (or Hellenic), Armenian, Persian, and Sanskrit. Just as the Teutonic tongues are believed to be the offspring of one parent Teutonic tongue, so this parent Teutonic and the other members of the Aryan family are all believed to be descended from one primitive language, the Aryan or Indo-European parent speech. The people who spoke this primeval Aryan language, the ancestors (linguistically at least) of the Aryan races of Europe and Asia, are believed by many to have had their seat in Central Asia to the eastward of the southern extremity of the Caspian Sea. This, however, is very problematical, and some philologists see reason to think that Europe may rather have been the original home of the Aryans. This latter view is now perhaps the one most generally held.

How remote the period may have been when the ancestors of the Teutons, the Celts, the Slavs, the Greeks, Romans, Persians, and Hindus were living together and speaking a common language is uncertain. Yet the general character of their language is approximately known, and philologists tell us with some confidence what consonant and what vowel sounds the Aryan parent speech must have possessed, what were the forms of its inflections, and what, at the least, must have been the extent of its vocabulary, judging from the words that can still be traced as forming a common possession of the sister tongues of the family.

In order to understand how it is that many words in the different Aryan tongues are really of the same origin, though superficially they may appear very different, it is necessary to know something of *Grimm's Law*. This law, which, like a natural law, is simply a statement of observed facts, is so named from the great German philologist who first definitely laid it down as the result of observation and comparison of the relative linguistic phenomena. It concerns the so-called "mute" consonants (*t, d, th; k, g, h (ch); p, b, f*) and takes effect more especially when these are initial. According to it, in words and roots that form a common possession of the Aryan tongues, being inherited by them from the parent speech, where in English (more especially Anglo-Saxon) and in most of the Teutonic tongues we find *t, d, or th*; we find in Latin, Greek, and Sanskrit not these letters, but respectively *d* instead of *t*, an aspirated sound instead of *d*, and *t* instead of *th*. That is, an English *t* corresponds to a Latin, Greek, and Sanskrit *d*, as is seen in *tame*; compared with L. *domare*, Gr. *damaein*, Skr. *dam*, to tame; an English *d* corresponds to Latin *f*, Greek *th*, Sanskrit *dh*, as in E. *door*, L. *fores*, Gr. *thyra*, Skr. *dvāra* (for original *dhwāra*), a door; an English *th* corresponds to Latin, Greek, and Sanskrit *t*, as in *thin*, compared with L. *tenuis*, Gr. *tanaos*, Skr. *tanu*, from root *tan*, to stretch. If we next take the gutturals we find that English *k* (or *c* hard), *g*, *h*, correspond respectively in the above languages to *g, h (ch, gh), k*, as is seen in E. *kin*, L. *genus*, Gr. *genos*, Skr. *janas* (where *j* is for original *g*); E. *goose* (modified from original *gans*), compared with L. *anser* (for older *hanser*), Gr. *chēn*, Skr. *hansa*; E. *head* (A. Sax. *heafod*), L. *caput*, Gr. *kephalē*, Skr. *kapāla*. Similarly *b* in English corresponds to *f* in Latin, *ph* in Greek, and *bh* in Sanskrit, as in *brother*=L. *frater*, Gr. *phratēr*, Skr. *bhratṛi*, a brother; *f* in English to *p* in Latin, Greek, and Sanskrit, as in *father*=L. *pater*, Gr. *patēr*, Skr. *pitrī*, father. German exhibits certain letter-changes peculiar to itself, and for this reason is placed, in any full statement of Grimm's law, apart from the other Teutonic tongues. In German, for instance, *t* takes the place of an English *d*, as in G. *tag*, E. *day*, G. *teil*, E. *deal*; *d* the place of *th*, as in G. *ding*, E. *thing*, G. *drei*, E. *three*, etc. In some cases the law does not operate in consequence of the influence of other letters; thus the *s* of *stand* prevents the *t*

from becoming *th*, as it ought to do to represent the *t* of *L. stare*, to stand. Certain other exceptions to the law are accounted for by a subsidiary law of more recent discovery than Grimm's law, known as the *Verner's Law*, and formulating certain facts connected with the original accentuation of Aryan words.

The Aryan tongues, ancient and modern, are entitled to claim the first rank among the languages of the globe, both for richness, harmony, and variety, and more especially as embodying a series of literature to which no other family of tongues can show a parallel. Next in importance come the Semitic tongues—Hebrew, Chaldee, Syriac, Arabic, etc. These, like the Aryan tongues, form a well-marked family, one notable peculiarity of which is the possession of "triliteral" roots, or roots of which three consonants form the basis and give the general meaning, while inflection or modification of meaning is indicated by internal vowel-change. Thus the vowels play a subordinate part to the consonants, and do not, as in the Aryan tongues, associate with them on equal terms. Other important linguistic families are *Hamitic*, which includes the ancient Egyptian, the Coptic, Berber, Galla, Somali, etc.; the *Turanian* or *Ural-Altaic*, which includes Turkish, Finnish, Hungarian, Mongolian, etc.; and the *South-Eastern Asiatic*, which includes Chinese, Siamese, etc. The Turanian languages belong to the type known as *agglutinate* or *agglutinating*, being so called from the fact that the root always maintains a sort of independence or distinctive existence, the other elements of the word being more or less loosely "glued" or stuck on as it were. The Chinese is the chief of the *monosyllabic* languages, so called from their words consisting normally of monosyllables. Other families of languages are the Malayo-Polynesian of the Indian Archipelago and Pacific; the Bantu, a great family of South Africa; and the American Indian languages, which are characterized as *polysynthetic*, from the way in which they crowd as many ideas as possible into one unwieldy expression. All these families form groups, so far as is known, separate from and independent of each other; and attempts to connect any two of them, as Aryan and Semitic for instance, have met with little success. Formerly etymologists had no hesitation in deriving English words from Hebrew roots, but this was in the days when there was no science of comparative philology. That all languages are descendants of one original tongue, as is believed by many, linguistic science can neither affirm nor deny. We may add that community of language is not a proof of community of race, since it is well known that, as the result of war or otherwise, races have given up the language that once belonged to them and adopted some other.

**Philome'la**, in Greek mythology, a daughter of Pandion, king of Athens, who being violated and deprived of her tongue by Tereus, the husband of her sister Progne, made known her wrongs to the latter by embroidering it in tapestry. In revenge the sisters murdered

Itys, the son of Progne by Tereus, and served him up to his father. Tereus pursued them, but they were changed by the gods into birds, Philomela and Progne into a nightingale and a swallow, and Tereus into a lapwing.

**Philopœ'men** (252–183 B.C.), an ancient Greek patriot and commander, b. at Megalopolis, in Arcadia. Having distinguished himself in war against the Spartans, he was, in 208 B.C., appointed commander in chief of the forces of the Achæan League. He defeated and slew with his own hand Machanidas, tyrant of Sparta, and subsequently defeated Nabis, the successor of Machanidas. Philopœmen, as commander of the Achæans, declared war against Sparta, and, having taken the city, treated it with the greatest severity. Messene now revolted, and Philopœmen, though broken by infirmity and disease, drove back the insurgents, but was afterward taken prisoner, carried in chains to Messene, and compelled to drink poison.

**Philosophy**, a term first brought into general use by Socrates. Philosophy is the science that deals with the general principles which form the basis of the other sciences, and of which they themselves take no cognizance. It follows up the data of experience to their ultimate grounds, regarding each particular fact in relation only to a final principle, and as a determinate link in the system of knowledge. In this view philosophy may be defined as the science of principles.

For all practical purposes the history of philosophy may be treated as commencing with the Greeks, the philosophic notions of the inhabitants of the East being considered merely as introductory to the Greek philosophy, in which many Oriental notions were incorporated. The first problem of Greek philosophy was to explain the enigma of external nature, to solve the problem not of the soul but of the world. Thales (about 600 B.C.) stands at the head of the Ionian school, which, with the Eleatic school, was the chief representative of speculative thought in pre-Socratic times; the former of these schools being characterized by Aristotle as seeking to find a material, the latter a formal principle of all things. The material principle sought by the Ionian school was assumed to be water by Thales, a primitive, infinite, but undetermined matter, by Anaxamander, and air, by Anaximenes. The Pythagoreans, abstracting from the quantitative rather than the qualitative character of matter, substituted a symbolic principle—number—for the sensuous principle; but the Eleatics, transcending alike the sensuous principle of the Ionics and the quantitative principle of the Pythagoreans, conceived of pure being as the one sole substance, the phenomenal world being viewed as unreal. The three great philosophers of this school are its founder Xenophanes, Parmenides, and Zeno. The transition from abstract to concrete being, from the Eleatic principle of unity to the world of phenomena, was attempted by Heraclitus (about 520 B.C.), who asserted for an absolute principle the unity of being and non-

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being—becoming. According to him all things are in constant flux, the product of conflicting opposites, of the One at once warring and harmonizing with itself. Empedocles (440 B.C.), in attempting to solve the reason of this flux, advanced the theory that matter was the principle of permanent being, while force was the principle of movement. The two moving forces in his system were love and hate. According to the Atomists, on the other hand, who are represented by Leucippus and Democritus (450 B.C.), the moving forces became an unintelligible necessity giving form to the world. Anaxagoras (b. about 500) asserted reason as the principle, and though he did not develop his theory to any extent, the mere expression of a spiritual principle is sufficient to mark it as forming an era in philosophy. In the hands of the Sophists this principle, in the sense of individual reason, became the occasion of their denial of all objective reality. In Socrates (470-399 B.C.), who united scientific method and a high ethical and religious spirit, the destructive teaching of the Sophists found its keenest opponent. What are called the minor Socratic schools—the Cynics, Cyrenaics, and Megarians—severally professed to regard Socrates as their founder, the Cynics, however, defining the end of action as self-sufficiency, the Cyrenaics as pleasure, and the Megarians as reason. With Plato (430-347) philosophy lost its one-sided character. Though professing a disciple of Socrates his system of idealism is his own. The Platonic idea is the pure archetypal essence, which is the source of all the finite realities that correspond to it. The visible world is an inferior reproduction of the world of pure ideas, where shine in all their splendor the good, the true, and the beautiful. In logic Plato brings back science to general ideas. In ethics the highest end of man is regarded as the unity of his nature. Plato's ideal theory is criticised by Aristotle, because he gives no real explanation of the connection between the phenomenal and the ideal. In Aristotle's own system, instead of beginning with the general and the absolute, as Plato had done, he begins with the particular and individual. His whole philosophy is a description of the given and empirical; and his method is induction. His system presents us with a number of co-ordinate sciences, each having its independent foundation, but no highest science which should comprehend them all. The three schools of Greek philosophy which followed the systems of Plato and Aristotle, and which mark the declining days of Greece, are those of the Stoics, Epicureans, and Skeptics. Rome had no philosophy properly its own; the universal character of Roman philosophizing was eclecticism, of which Cicero was the most illustrious representative. In Alexandria Eastern and Western philosophy, as also Judaism, Christianity, and Paganism, came into contact. Neo-Platonism, founded by Ammonius Saccas (A.D. 193), strove to combine, in opposition to Christianity, the chief elements of classical and Eastern speculation. Hellenic ideas were mingled with a vague

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symbolism, and with theories of ecstasy and divine union. Christianity, in the apologists of the second century and the Alexandrine fathers, related itself very early to the philosophy of the time, but not until about the eleventh century did there begin to manifest itself a distinctive Christian philosophy in scholasticism, which, assuming the dogmas of the church to be absolutely true, sought to justify them to the reason.

Modern philosophy, which begins with the fifteenth century, is characterized by a freer, more independent spirit of inquiry. First the scholastic philosophy was attacked by those who called to mind the ancient Greek philosophy in its original purity. After this struggle new views were presented. Bacon and Locke on the one hand, and Descartes on the other, stand respectively at the head of the two systems, empiricism and idealism, which begin modern philosophy. Bacon created no definite system of philosophy, but gave a new direction to thought, the empiricism which he founded finally developing into skepticism. The system of Descartes was opposed by Gassendi, and received modifications at the hands of others, especially Malebranche. The most important successor, however, of Descartes was Spinoza, who reduced the three Cartesian substances to unity, to one infinite original substance, the ground of all things, that excludes from itself all negation or determination, and is named God or nature. Locke (1632-1704), who had a precursor in Hobbes (1588-1679), the influence of whom, however, chiefly concerned the history of political science, is regarded as the father of modern materialism and empiricism. As occupying the general position of Locke mention may be made of Isaac Newton, Samuel Clarke, William Wollaston, the Earl of Shaftesbury, and Francis Hutcheson. The philosophy of Locke received a further development in France, where Condillac sought to explain the development of humanity by the simple development of the sensations. Then followed the materialism of Helvetius, d'Holbach, La Mettrie, and others, including several of the encyclopedists. In opposition to this materialistic tendency arose the idealism of Leibnitz and Berkeley. The theories of Leibnitz were systematized by Wolff, and from his time to Kant German philosophy assumed no new standpoint. Berkeley (1684-1753), founding on Locke's principle that we are percipient of nothing but our own perceptions and ideas, argued that the existence of bodies out of a mind perceiving them is impossible, and a contradiction in terms. Granting the premises of Berkeley, his conclusions could not be refuted; but it was reserved for Hume to trace out the ultimate consequences of the Cartesian and Lockian philosophy, and thus, though unintentionally, by a sort of *reductio ad absurdum*, to produce the great metaphysical revolution of which Reid and Kant were the first movers. The Scottish or "common sense" school of philosophy, with Reid (1710-96) at its head, has the merit of having first strongly incul-



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cated the necessity of admitting certain principles independent of experience, as the indispensable conditions of thought itself. Reid therefore directed his inquiries to an analysis of the various powers and principles of our constitution, in order to discover the fundamental laws of belief which form the groundwork of human knowledge. Dugald Stewart, with some deviations, followed in the track of his master; but Thomas Brown departed on many points of fundamental importance from Reid's philosophy. The same occasion that gave rise to the Scottish school also produced the philosophy of Emmanuel Kant. Kant (1724-1804), who may be justly regarded as the father of the philosophy of the nineteenth century, sought to bring together into unity the one-sided endeavors of his predecessors in the realistic and idealistic schools. He took up a critical standpoint, and from it instituted an inquiry into the origin of our experience or cognition. The ablest opponent of the Kantian philosophy, Jacobi, took the standpoint of faith in opposition to that of criticism, in order to give theoretic certainty to the postulates of the practical reason.

In the hands of Fichte the critical idealism of Kant becomes absolutely subjective idealism. "All that is, is ego;" this is the principle of the Fichtian system; the world is merely phenomenal, consciousness is a phenomenon, perception is a dream. Fichte's subjective idealism found its continuation in the objective idealism of Schelling and the absolute idealism of Hegel. Schelling (1775-1854) started from the ego of Fichte, and by a combination of the doctrine of the ego with Spinozism transformed it into the system of identity. Object and subject, real and ideal, nature and spirit, are identical in the absolute, and this identity we perceive by intellectual intuition. Schelling subsequently, by successively incorporating into his system various opinions from Bruno, Böhme, and others, developed a syncretistic doctrine which constantly approximated to mysticism. Hegel (1770-1831), developing this principle of identity, created the system of absolute idealism. In his philosophy he aims at elevating consciousness to the standpoint of absolute knowledge, and systematically developing the entire contents of this knowledge by means of the dialectical method. Schleiermacher (1768-1834) promulgated an eclecticism to which Plato, Spinoza, Kant, and Schelling were the chief contributors. Schopenhauer (1788-1860) developed a doctrine which may be described as a transitional form from the idealism of Kant to the realism at present prevalent. In opposition to Fichte's subjective idealism, and to Schelling's renewed Spinozism Herbart (1776-1841) developed a philosophic scheme on the basis of the realistic element in the Kantian philosophy, as also of Eleatic, Platonic, and Leibnitzian doctrines. After the death of Hegel, Feuerbach, Richter, Strauss, Arnold Ruge, and others developed, in an extreme manner, Hegelian thought, and recently Hegelianism has counted more adherents than any other system. Next to it has

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stood the Herbartian school; and more recently the modification of systems through a return to Aristotle or Kant, and the study of philosophy upon its historic side, have occupied the larger number of minds. While resting in part upon the basis of the doctrines of earlier thinkers, Trendelenburg, Lotze, and others have advanced in new and peculiar paths. In France two philosophical tendencies opposed the sensualism and materialism so universal at the beginning of the century. Of these the one was theosophical and the other found expression in the eclectic and spiritualistic school founded by Royer-Collard as the disciple of Reid, and further built up by Cousin, who incorporated into its body of doctrines a number of German philosophical notions. Jouffroy attempted to unite the philosophy of his predecessor Maine de Biran to that of the Scottish school, and became associated with the spiritualistic school, to which also belong the names of Garnier, Janet, Rémusat, Franck, Jules Simon, and others. This school has contended valiantly against the pantheistic tendencies of the age. Independent systems are those of Pierre Leroux, Lamennais, Jean Reynaud, and Buchez. Materialism has its supporters in Cabanis, who sees in thought only a secretion of the brain, Broussais, Gall, and others. Positivism, founded by Auguste Comte, numbers not a few followers.

In Great Britain the Scottish school had later exponents in Sir James Mackintosh (1765-1832) and Sir William Hamilton (1788-1856), the last named largely influenced in some points of his psychology by Kant. Mansel may be mentioned as a disciple of Hamilton. Ferrier (1808-64) assumed a polemical attitude toward the common-sense school in respect of its fundamental peculiarity, as he viewed it, of absorbing philosophy into psychology, as well as on minor details of the system. The associational psychology of Hartley, Priestly, and Dr. Darwin found representatives in the nineteenth century in James Mill (1773-1836) and his son John Stuart Mill (1806-73), who make the principle of association the sole explanation of psychical phenomena. Bain, Grote, and Lewes followed more or less in the same track. Herbert Spencer attempted to widen the psychological principles of the associational psychology into a universal doctrine of evolution. Among the chief leaders of philosophic thought opposed to the English school of empiricism may be mentioned the names of the late T. H. Green, Hutchison Stirling, and Edward Caird. In America, as in England, philosophy has been prosecuted more as an applied science, and in its special relations to morals, politics, and theology. Speculation here has been widely influenced by Scottish philosophy. Among the best known names of American philosophical writers are those of Jonathan Edwards, Henry P. Tappan, Thomas C. Upham, Francis Wayland, and others. A modified scholasticism, mostly Thomism, prevails in the Catholic seminaries of France, Spain, and Italy. In most of the continental countries German philosophy has exerted no

## Philostratus

small influence. In Italy a peculiar philosophical school, represented by Rosmini, Mamiani, and Gioberti, has flourished during the present century.

**Philos'tratus**, FLAVIUS, a Greek writer, b. at Lemnos about the middle of the second century. He taught rhetoric at Athens and subsequently at Rome, where he obtained the favor of the emperor Septimius Severus, and he accompanied the empress Julia Domna in her travels. His principal work is his *Life of Apollonius of Tyana*, supposed by some critics to be a parody on the Gospels. His other works are the *Heroica*, a history in dialogue of the heroes of the Trojan War, *Lives of the Sophists*, *Letters*, etc.

**Phlebot'omy** (Greek, *phleps*, *phlebos*, a vein, and *temnein*, to cut) (or venesection), the act of letting blood by opening a vein; a method of treatment formerly applied to almost all diseases, but now chiefly confined to cases of general or local plethora. Another mode of letting blood is by cupping or by the application of leeches. It has been one of the processes of the medical profession from the earliest times.

**Phleg'ethon**, in the Grecian mythology, a river of fire in the infernal regions.

**Phlox**, a genus of perennial herbaceous plants, natives for the most part of North America, though some of the species are to be met with in Asia. The flowers, which are favorites in gardens, are of a purple or violet color, more rarely white or red, with a salver-shaped corolla, and a narrow sub-cylindrical tube longer than the calyx. The trailing kinds are excellent for rock work.

**Pho'cion**, an Athenian general, and one of the most virtuous characters of antiquity; supposed to have been b. about B. C. 402. In the war with Philip of Macedon the Athenians sent Phocion with some troops to Eubœa, where he obtained a complete victory over the enemy. Some time after, he was dispatched to assist the cities of the Hellespont against Philip, whom he compelled to retire. According to Plutarch he was nominated commander forty-five times without once applying for the office. He always led a simple life, and cultivated his small farm with his own hands.

**Phœnicia**, in ancient geography, a country on the coast of Syria, bounded on the e. by Mount Lebanon, and containing the celebrated cities Tyre and Sidon. Phœnicia proper was a tract of country stretching along the eastern shore of the Mediterranean, not much more

## Phœnicia

than 28 mi. in length, and little more than 1 mi. in average breadth; Sidon being situated near its northern, and Tyre not far from its southern boundary. In a wider sense Phœnicia was regarded as beginning on the north with the Island of Aradus, and extending south to the town of Dora, a little below the promontory of Carmel, being about 120 mi. in length, and rarely more than 20 in breadth. It is watered by several streams flowing from Lebanon to the sea, such as the Eleutherus, the Adonis, the Lycus, the Tamyras, the Leontes. The country is fertile in timber, corn, fruits, etc.; and besides the great cities of Sidon and Tyre, it was anciently studded with numerous smaller towns, forming almost an unbroken line along the coast. Among these towns in earlier times were Arvad, Accho, Arka, Tripolis, Berytus, Sarepta, Dora, etc. Many of the roadsteads or harbors were excellent, but are now silted up.

The question as to the original seat of the Phœnicians has received no satisfactory solution; but that, like the Jews, they were Semites by race, is well known. Their immigration to the coast of the Mediterranean belongs to prehistoric times. The settlement of Israel in Canaan did not produce any great or permanent change on Phœnicia. The tribes of Naphtali, Asher, and Dan, to which it was assigned, did not conquer Phœnicia, but occupied only a small portion of it; and the subsequent relations of Israel and Phœnicia were for the most part those of amity, intercourse, and reciprocal advantage. The wealth and power of the Phœnicians arose from their command of the sea, and it was their policy not to provoke any of the nations to the east of them, and not to quarrel unnecessarily with Israel, which was their granary. The relation between Hiram and David was probably but a sample of such international treaties and intercourse. After the division of the Hebrew kingdom Phœnicia would naturally cultivate alliance with the Ten Tribes nearest to it, and Ahab married a Phœnician princess. The country was afterward successively incorporated in the Assyrian, Babylonian, and Persian empires, but the cities retained more or less their independence. It was next conquered by Alexander the Great, and henceforth simply formed part of Syria.

From a very early period the Phœnicians occupied themselves in distant voyages, and they must speedily have reached to a state of substantial shipbuilding. Xenophon passes a high eulogy on a Phœnician ship; they were skilled in navigation and the nautical applications of astronomy. Lebanon supplied them with abundance of timber, and Cyprus gave them all necessary naval equipments, from the keel to the top sails. In the region of Pharaoh-Necho these daring navigators even circumnavigated Africa, and the Phœnicians furnished Xerxes with three hundred ships, which took part in the battle of Salamis. The commerce of Tyre reached through the world. It traded in the produce of the whole known world, from the ivory and "bright iron" and



Phlox.



## Phœnicia

ebony and cotton fabrics of India to the tin from Cornwall and Devonshire. Fishing was also an important industry, and the Tyrians sold fish in Jerusalem. The Phœnicians excelled in the manufacture of the purple dye from the shellfish *murex*, abundant on its coasts. The glass of Sidon was no less famous than the Tyrian dye. Phœnicia produced also articles of silver and gold as well as of brass; its inhabitants were also skilled in architecture and mining.

The maritime knowledge and experience of Phœnicia led to the planting of numerous colonies in Cyprus, Rhodes, and the islands of the Ægean—the Cyclades and Sporades—in Sicily, in Sardinia, the Balearic Islands, and in Spain. The most celebrated of the Phœnician colonies, however, was Carthage, in Northern Africa, which extended its sway over the Spanish peninsula and disputed with Rome the supremacy of the Mediterranean.

As was the case in Canaan at the invasion, each Phœnician city was governed by a king or petty chief. A powerful aristocracy existed in the chief towns, and there were also elective magistrates, called by the Romans *suffetes*, a disguised form of the Hebrew *soffet*. Sidon, and afterward Tyre, exercised a hegemony over the other states. The relation of Phœnicia to her colonies does not seem to have been very close. Their religion, however, bound the mother country and the colonies in a common worship. Carthage often sent presents to the chief Phœnician god; so did Gades and other settlements.

The religion of the Phœnicians was a species of nature worship, the objects of adoration being the sun, moon, and five planets; or in another form it was the worship of male and female reproductive powers—the former represented as Baal and the latter as Baalith, Ash-toreth, or Astarte. The god called Il, a sort of Phœnician Chronos or Saturn, resembling the Moloch or Milcom of the Ammonites, had human sacrifices offered to him. Marine deities must have held a prominent place in their theogony—deities corresponding to the Greek Nereus and Poseidon, which last was worshipped at Berytus. In the oldest temples there were no images, but there were rude fetishes, conical or oblong stones, possibly aerolites. "fallen from heaven," and fossil belemnites. While the wealth and commerce of Phœnicia must have brought art and refinement, the people were noted for their dissoluteness. As a people the Phœnicians early obtained a reputation for cunning and faithlessness. They were often pirates; they were certainly slave-traders. They purchased slaves from the northern shores of the Black Sea, and they also kidnapped and sold the children of Israel—a practice which brought upon them the denunciation of the prophets, and a just retaliation was predicted to fall upon them.

The language of ancient Phœnicia was closely akin to Hebrew. The famous passage in the *Pœnulus* of Plautus illustrates the assertion. Of ninety-four words on a tablet discovered at Marseilles in 1845 relating to the

## Phonograph

sacrificial ritual, no less than seventy-four are found in the Old Testament. Coins and seals also disclose the same affinity as do the numerous inscriptions. Proper names can all be explained in the same way. The invention of letters is often ascribed to the Phœnicians. The Greeks believed that letters had been brought to them from Phœnicia by Cadmus. The literature of Phœnicia has perished.

**Phoenix**, a fabulous Egyptian bird, about the size of an eagle, with plumage partly red and partly golden. Of the various stories told of it by Herodotus and others the most popular is to the effect that the bird, at an age of 500 years, conscious of its approaching death, built a funeral pile of wood and aromatic gums, which it lighted with the fanning of its wings, and rose from the flames with a new life. The Egyptians regarded it as a symbol of immortality, and it is still used as an emblem of this.

**Phoenixville**, Chester co., Pa., on the Schuylkill River, 28 mi. n. w. of Philadelphia. Railroads: Pennsylvania, and the Philadelphia & Reading. Industries: extensive iron works producing iron bridges, nails, architectural iron, etc., also planing mills, silk, shirt, and stocking manufactories, and needle works. Pop. 1900, 9,196.

**Phonograph**, an instrument by means of which sounds can be permanently registered, and afterward reproduced from the register. It consists essentially of a curved tube, one end of which is fitted with a mouthpiece, while the other end (about 2 in. in diameter) is closed in with a disk or diaphragm of exceedingly thin metal. Connected with the center of this diaphragm is a steel point, which, when the sounds are projected on the disk from the mouthpiece, vibrates backward and forward. This part of the apparatus is adjusted to a cylinder which rotates on a horizontal axis. On the surface of the cylinder is cut a spiral groove, and on the axis there is a spiral screw of the same pitch, which works in a nut. When the instrument is to be used a piece of tin foil is gummed round the cylinder, and the steel point is adjusted so as to be just touching the tin foil, and above the line of the spiral groove. If some words are now spoken through the mouthpiece, and the cylinder kept rotating either by the hand or clockwork, a series of small indentations are made on the foil by the vibratory movement of the steel point, and these markings have all an individual character of their own, due to the various sounds addressed to the mouthpiece. The sounds thus registered are reproduced by approaching the diaphragm and its steel point toward the tin foil as at first commencing, at the point where it was when the cylinder originally started, and then once more setting the cylinder in motion. The indentations previously made now cause the steel point to rise or fall or otherwise move as the markings pass under it, and the result is that the diaphragm is thrown into a state of vibration exactly corresponding to the movements induced by the markings, and thus affects the air around so as to produce sounds, and these vibrations being ex-



## Phosphate

actly similar to those originally made by the voice, necessarily reproduce the sounds to the ear as the words at first spoken. These marked strips of foil may be posted to any person with whom the speaker wishes to correspond, and who must, of course, have a machine similar to that of the sender. The contents of the strips may be reproduced at any length of time, and repeated until the markings become effaced.

**Phosphate**, in chemistry, the generic term for the salts formed by the union of phosphoric anhydride with bases or water or both. They play a leading part in the chemistry of animal and plant life, the most important in this connection being the phosphate of soda, phosphate of lime, and the basic phosphate of magnesia. In agriculture the adequate supply of phosphates to plants in the form of manures becomes a matter of necessity in all depleted soils. These phosphatic manures consist for the most part of bones, ground bones, mineral phosphates, basic slag, superphosphates and reduced superphosphates, bone-ash and phosphatic guano.

**Phosphores'cence**, the property which certain bodies possess of becoming luminous without undergoing obvious combustion. It is sometimes a chemical, sometimes a physical action. Certain mineral substances exhibit the phenomenon when submitted to insolation, to heat, to friction, to electricity, or to cleavage. Rain, water spouts, and meteoric dust sometimes present a self-luminous appearance. Several vegetable organisms, chiefly cryptogams, exhibit this kind of luminosity; but the most interesting cases of phosphorescence occur in the animal world, the species in which the luminous property has been observed belonging nearly to every main group of the zoological series. In some of the lowest life forms and in many of the jelly fishes the whole surface of the body is phosphorescent; in other organisms the phosphorescent property is localized in certain organs, as in the sea-pens, certain annelids, the glow worms, fire flies, etc.; while many deep sea fishes have shining bodies embedded in the skin. The phosphorescence of the sea is produced by the scintillating or phosphorescent light emitted from the bodies of certain microscopic marine animals, and is well seen on the surface of the ocean at night. Phosphorescence in animals appears to be a vital process, consisting essentially in the conversion of nervous force (vital energy) into light; just as the same force can be converted by certain fishes into electricity.

**Phospho'ric Acid**, an acid usually obtained by burning phosphoretted hydrogen in atmospheric air or oxygen. It is also produced by the oxidation of phosphorous acid, by oxidizing phosphorus with nitric acid, by the decomposition of apatite and other native phosphates, and in various other ways. It is used in medicine in the form of solution, constituting the dilute acid of the *Pharmacopœia*. It is peculiarly suited to disordered states of the mucous surfaces, and also to states of debility, characterized by softening of the bones.

## Photius

**Phos'phorus**, a solid non-metallic combustible substance ranking as one of the elements. It occurs chiefly in combination with oxygen, calcium, and magnesium, in volcanic and other rocks, whose disintegration constitutes very fertile soils. It exists also in the plants used by man as food, and is a never-failing and important constituent in animal structures. It is manufactured from bones, which consist in part of phosphate of lime, or from native mineral phosphate of lime. Common phosphorus when pure is almost transparent and colorless. At common temperatures it is a soft solid, easily cut with a knife, and the cut surface has a waxy luster; at 108° it fuses, and at 550° is converted into vapor. It is exceedingly inflammable. Exposed to the air at common temperatures it undergoes slow combustion, emits a white vapor of a peculiar alliaceous odor, appears luminous in the dark, and is gradually consumed. On this account phosphorus should always be kept under water. A very slight degree of heat is sufficient to inflame phosphorus in the open air. Gentle pressure between the fingers, friction, or a temperature not much above its point of fusion, kindles it readily. It burns rapidly even in the air, emitting a splendid white light, and causing intense heat. Its combustion is far more rapid in oxygen gas, and the light far more vivid. The product of the perfect combustion of phosphorus is phosphorous pentoxide or phosphoric anhydride, a white solid which readily takes up water, passing into phosphoric acid. Compounds of phosphoric anhydride with basic bodies are known as *phosphates*. Phosphorus may be made to combine with most of the metals, forming compounds called *phosphides*. When dissolved in fat oils it forms a solution which is luminous in the dark. It is chiefly used in the preparation of lucifer matches, and also in the preparation of phosphoric acid. It is of all stimulants the most powerful and diffusible, but on account of its activity highly dangerous. It can be safely administered as a medicine only in extremely minute doses and with the utmost possible caution. Phosphorus presents a good example of allotropy, in that it can be exhibited in at least one other form, known as *red* or *amorphous phosphorus*, presenting completely different properties from common phosphorus. This variety is produced by keeping common phosphorus a long time slightly below the boiling point. It is a red, hard, brittle substance, not fusible, not poisonous, and not readily inflammable, so that it may be handled with impunity. When heated to the boiling point it changes back to common phosphorus.

**Pho'tius**, a patriarch of Constantinople, born of patrician parents in that city early in the ninth century. His wealth and interest raised him to the highest offices of the state, while he enjoyed the reputation of being the most universally learned and accomplished man of his age. He became secretary of state under the Emperor Michael III, and contracted an intimacy with the minister Bardas, uncle of the emperor. On the deposition of the pa-

## Photo-engraving

triarch Ignatius, Bardas persuaded the emperor to raise Photius to the patriarchal dignity. The installation was recognized by the metropolitans of the patriarchate, but was opposed by Pope Nicholas I, whom Photius soon after excommunicated, thereby laying the foundation of the schism between the Eastern and Western churches. But the Emperor Michael having been murdered in 867 by Basil, who was raised to the throne, that prince immediately replaced Ignatius in his office, and banished Photius, who, however, resumed his dignity on the death of Ignatius in 878. On the accession of Leo, son of Basil, to the imperial throne in 886, Photius was again deposed and banished to a monastery in Armenia, where, in 891, his death took place. Photius was an able ecclesiastical statesman, and a man of great intellect, erudition, and literary power. His chief work, the *Myriobiblion*, may be described as an extensive review of ancient Greek literature.

**Photo-engraving**, a common name of many processes in which the action of light on a sensitized surface is made to change the nature or condition of the substance of the plate or its coating, so that it may by processes be made to afford a printing surface corresponding to the original from which the photographic image was derived.

**Photography** (Greek, *photos*, light; and *grapho*, to write), is the art of writing or drawing by light; taking representations of objects by the action of light through the lenses of a *camera obscura*, or on a previously prepared surface. The perfection of photography has not been reached and its successful manipulation is of comparatively recent date, although as early as the beginning of the present century likenesses of persons had been finished on glass. The first part of the year 1809, Thomas Wedgwood discovered a way of making crude profiles by the action of light upon nitrate of silver. He also made many experiments and succeeded in making the first copies from paintings. France added to the early progress in photography when, in 1814, M. Nicephore Niepce discovered a method whereby he produced pictures on plates of metal coated with asphaltum, at the same time rendering them permanent.

Daguerre, in 1839, announced what was the foundation of photography as we have it today. By means of the Daguerreotype, which was printing the detail on sensitized glass, and by the use of a shadow plate, the full effect of a photograph was wrought out. This great discovery was followed rapidly by others. Henry Fox Talbot found a process whereby he was able to produce pictures in the camera by the agency of light on paper coated with chloride and nitrate of silver. One of the great features of his formula was that the impressions were made permanent. The process was called Calotype (from *kalos*, fair, and *typus*, an impression). In the course of his experiments, covering a period of four years, he made many improvements, and in 1841 he secured several patents. The process is known

## Photography

to students as Talbotype. Each succeeding year added new ideas in the art of photography. Among the most important processes which followed were those of M. Niepce de St. Victor and Scott Archer. The former introduced the use of albumen paper, and the latter that of collodion as a substitute for paper. In both processes the substances were spread over a plate of glass. In 1851 Mr. Archer perfected the "wet plate" process, and full working details were published. It has been with these same wet plates that some of the most notable results in photography have been obtained. In 1856, Dr. Hill Norris explained the process of collodion dry plates. The year 1864 brought out the collodion emulsion dry plates by Messrs. Sayee & Bolton. Dr. R. L. Maddox was the founder of the gelatin plate process, and in 1871 he successfully completed his experiments, finding that glass plates could be coated with an emulsion consisting of bromide of silver contained in gelatin. Bennet added a number of improvements to the handling of dry plates in 1878, and the outcome was that in two years the process came into general use and since its advantages over past methods have been discovered it is almost the only process now employed. In 1887 some startling advances were made in color photography, and Mr. Mayall made known the secret whereby objects might be photographed in natural colors. Blue and red were the first colors to be found, but so far it has been impossible to bring into harmony that other primary color, yellow.

It has been announced from time to time that color photography was an accomplished fact. Such was the case when the Cellerier-Parks process was brought forward but its perfection lies in the future. The gelatin plate has done much toward the advancement of photography, and its applications are endless. The hand camera and the instantaneous shutter have given the world pictures of people and animals in action, the positions of which could never have been caught by a human eye. Many improvements have been made in the instantaneous shutters since 1890. They are now so carefully adjusted by mechanical appliances that they can be regulated to  $\frac{1}{360}$  of a second, or a prolonged exposure can be given the subject at will. Through the instantaneous process scientists have been able to analyze muscular movements and the various modes of locomotion. Pictures of the most remote part of the heavens have been made common by photography, and the study of astronomy has been greatly advanced. Its application in the various processes of book illustration has also been very successful. Photography by the use of artificial light has also been very successful and has reached a degree of perfection.

In 1895, Thomas Edison discovered that by means of the X-rays, photographs could be taken looking through the body, showing the bones. His discovery has proved to be quite accurate in locating bullets in the human body. Photographing through any substance, wood or stone, and showing the interior contents has

## Photography

been the outcome of this process and is known as the X-ray photography. Lenses and shutters have been so arranged as to take a series of passing people and faithfully portray every motion of the person or persons photographed. Photographs may be either negative or positive. Negative photographs are produced in the camera, and exhibit the lights and shades contrary to nature, that is, the lights dark and the shades light. In order to obtain positives or prints several methods are employed. In silver printing, a paper sensitized by being floated on a solution of albumen mixed with common salt and then on a solution of nitrate of silver, is placed in close contact with the negative in a printing-frame and exposed to the light until the silver compounds have been sufficiently darkened. It is afterwards toned, fixed, and washed.

In the "bromide" process the paper is coated with a sensitized gelatin solution and positive prints are made by contact or by the enlarging camera, employing either day or artificial light. In the platinotype process the paper is sensitized by *ferric oxalate* and a double salt of potassium and platinum. The latter process requires no toning and produces a permanent print. This process was first discovered in 1855 by M. Poitevier, who combined carbon with gelatin, starch, or gum, applied it over the surface of paper, dried it, submitted it to the action of light under a photographic negative and so produced what is now known as a carbon print. The idea was not brought to perfection until 1864 when Mr. Swan of England, whose idea it was to prepare a solution of gelatin and bichromate of potash (the latter being the sensitizing agent), mixed with a black pigment and apply the mixture as a coating to a sheet of paper and print the positives on the black tissue, as it is called.

Walter Woodbury discovered a process whereby the hardened tissue is brought into contact with a plate of type metal, under considerable pressure. The plate takes the impression of the relief and pictures are printed from it instead of from the raised tissue.

Photography has brought about many improvements in the art of lithography. Photolithography, the process of reproducing copies of photographs and painting from a lithographic stone, was discovered in 1859 by Asser of Amsterdam. The most common methods used in multiplying photographic pictures by photolithography is to take a print on paper sensitized with gelatin and bichromate of potassium and then ink it with a suitable oily ink. This ink adheres to the parts acted on by the light and has become insoluble, but when the gelatin is still soluble the ink can easily be wiped off with a soft cloth. The process is completed by transferring to the lithographic stone in the usual way. Photozincography has been one of the discoveries of the past twenty-five years. The process consists in projecting an impression on a plate of prepared zinc by photography, and then etching and engraving with acids so that any

## Photometry

number of impressions can be made from the plate. Photography has been so simplified that amateurs have been able to secure results, some of which have equalled that done by professionals.

**Photogravure.**—By this process the finest possible results are obtained, but the expense of producing pictures by its aid, which is akin to the operation of copperplate printing, limits its use to high-class book work. It is also used for the production of large pictures which rival the finest steel engravings in their delicacy and finish. Photographs can be reproduced in this form, but the process seems to be more largely employed for obtaining engraving-like copies of celebrated pictures. The process is so perfect that every touch of the painter's brush is clearly seen in the copy, and even the upstanding ridges of paint in the bolder touches are rigidly reproduced. There are naturally different ways by which printing plates for use in this process are made, and a brief description of two methods only must here suffice to give an indication of the line of operations. (1) A gelatin relief is obtained by exposing bichromated gelatin to the action of light beneath the negative. But the gelatin employed is mingled with a certain quantity of graphite (black lead) in a more or less granular form. This addition causes the resulting relief to have a surface which is granular in character, and which is also a conducting one to electricity. If therefore the relief be placed in an electrotype bath it will speedily become covered with a deposit of copper. From the copper plate so formed copies on paper can be obtained by the usual copperplate printing process. (2) A bichromated gelatin print—negative in character—is developed upon the specially prepared surface of a copper plate, which is then subjected to the action of a solution of perchloride of iron. This penetrates the gelatin more or less quickly according to its varying thickness, and then attacks the copper, which is eaten away by the chemical action that ensues. Thus in the end the copper plate bears on its surface an etched image, penetrating more or less in depth according to the shadows and lights of the gelatin image previously affixed to it. The plate is next "steel"-faced and printed in the copper-plate press.

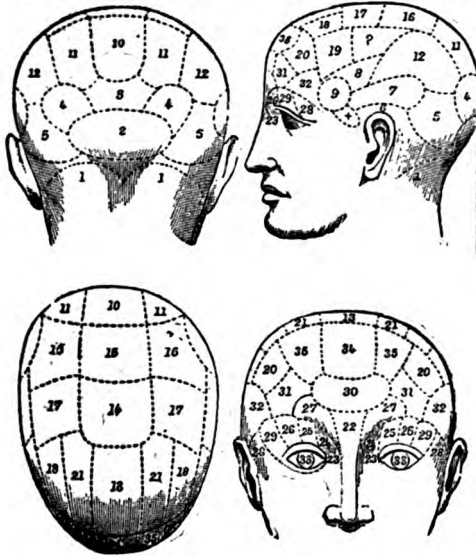
**Photometry** (Gr. *phos*, "light," and *metron*, "measure"), the art of measuring the intensity of a source of light, by comparison with a standard of reference. Instruments have been devised for applying the many different methods to each part of the spectrum of the light from each source. The degree of sensitiveness of the eye of the observer, or a difference of sensitiveness between his two eyes, affects the result. In other instruments used as photometers what is measured is not the luminous intensity so much as the radiation. Stellar photometry is generally contrived by stopping off more or less of the surface of the object glass, or by polarizing apparatus, so as to bring the apparent brightness of a star down to that of a standard of comparison.



## Photophone

**Pho'tophone**, an instrument invented in 1880 by Prof. Graham Bell, which resembles the telephone, except that it transmits sounds by means of a beam of light instead of the connecting wire of the telephone. The success of the instrument depends upon a peculiar property of the rare metal selenium, that, namely, of offering more or less opposition to the passage of electricity according as it is acted upon or not by light. In its simplest form the apparatus consists at the receiving end of a plane mirror of some flexible material (such as silvered mica) upon which a beam of light is concentrated, and the voice of a speaker directed against the back of this mirror throws the beam of light reflected from its surface into undulations which are received on a parabolic reflector at the other end, and are centered on a sensitive selenium cell in connection with a telephone, which reproduces in articulate speech the undulations set up in the beam of light by the voice of the speaker.

**Phrenology**, the term applied to the psy-



### AFFECTIVE.

#### I.—PROPENSITIES.

1. Amativeness.
2. Philoprogenitiveness
3. Inhabitiveness or Concentrativeness.
4. Adhesiveness.
5. Combativeness.
6. Destructiveness and Allmentiveness.
7. Secretiveness.
8. Acquisitiveness.
9. Constructiveness.

#### II.—SENTIMENTS.

10. Self-esteem.
11. Love of Approbation.
12. Cautiousness.
13. Benevolence.
14. Veneration.
15. Firmness.
16. Conscientiousness.
17. Hope.
18. Wonder.
19. Ideality.
20. Wit.
21. Imitation.

### INTELLECTUAL.

#### I.—PERCEPTIVE.

22. Individuality.
23. Form.
24. Size.
25. Weight.
26. Coloring.
27. Locality.
28. Number.

29. Order.
30. Eventuality.
31. Time.
32. Tune.
33. Language.

#### II.—REFLECTIVE.

34. Comparison.
35. Causality.

## Phrenology

chological theories of Gall and Spurzheim, founded upon 1, the discovery that the brain, as the organ of the mind, is not so much a single organ as a complex congeries of organs; and 2, observations as to the existence of a certain correspondence between the aptitudes of the individual and the configuration of his skull. Phrenology may therefore be regarded as a development, partly scientific and partly empirical, of the general idea that a correspondence exists between the physical structure and the psychical and mental traits of every individual man or animal. It was long ago observed by physiologists that in animals a certain character and intelligence seemed to accompany a certain formation and size of skull. Lavater, in his system of physiognomy, went further than this, and gave to particular shapes of the head certain powers and passions; the conical head he terms *religious*; the narrow retreating front, *weak-minded*; the broad neck, *salacious*; etc. But it was reserved to Drs. Gall and Spurzheim to expand this germ of doctrine into a minute system, and to map out the whole cranium into small sections, each section being the dwelling place of a certain faculty, propensity, or sentiment. Gall first started this so-called science; but to Spurzheim it is mainly indebted for its systematic arrangement, and to Dr. Combe of Edinburgh for its advocacy. Gall commenced giving private lectures on the subject in 1796. In 1800 he was joined by Spurzheim, who continued his colleague till 1813, both conducting their researches in common, and traveling together from place to place. At Paris their theories were investigated by a commission of the Institute of France, the result being an unfavorable report drawn up by the celebrated Cuvier. In 1814 Spurzheim went to England, where his lectures gained many disciples, among others George Combe of Edinburgh, one of the best expounders and defenders of phrenology which the science yet can boast. Spurzheim eventually came to America, where he d. in 1832.

So far as phrenology was scientific it undoubtedly was one cause which led to the minute anatomical investigations to which the brain has latterly been subjected; and Gall and Spurzheim have high claims to be regarded as anatomical discoverers and pioneers. Previous to their dissections the brain had generally been regarded as a single organ rather than a complex congeries of organs. Gall's view of the physiology of the brain was, that the convolutions are distinct nervous centers, each having its own special activity; that the frontal lobes are occupied by the perceptive group of centers; the superior lobes by the moral and æsthetic groups; the inferior lobes by the group mainly concerned in the nutrition and adaptation of the animal to external conditions; and the posterior lobes to the social instinct. To a considerable extent these views have been pronounced to be well founded by later specialists, and thus the leading positions of Gall and Spurzheim have taken a place in scientific physiology as repre-

## Phrygia

sented by Bain, Carpenter, Ferrier, Wagner, Huschke, and others.

The empirical side of phrenology, sometimes called *craniology*, rests upon the assumption that the relative development of the centers of the brain can be accurately determined by an external examination of the protuberances and depressions of the skull. Craniology is admitted to have a certain degree of foundation in the general truths of physiology, but it cannot pretend to scientific exactness or well-reasoned theory, and in the hands of those who know it best it usually makes no such claim. Its conclusions, like its data, are uncertain and general, because in attempting to delineate a man mentally, morally, and physically, there are so many things other than the external shape of the skull which have to be taken into account, and also so many things of essential importance of which it is impossible to take account. For example, the cranium may be small, and yet, owing to the depth of the furrows, the cortex or thinking membrane of the brain may be large; on the other hand, owing to the superficial nature of the furrows, a large cranium may co-exist with a very limited development of cortex; and such a fact as this, it is obvious, is unverifiable in any special instance without *post mortem* examination.

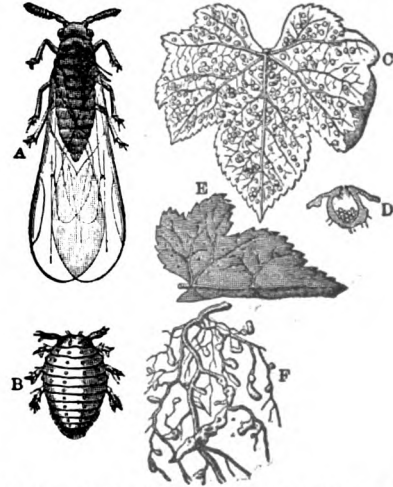
**Phrygia**, in ancient geography a region comprising the western central part of Asia Minor, containing the cities Apamea, Laodicea, and Colossæ. The inhabitants were early civilized, and paid much attention to grazing and tillage. The early history of Phrygia is mythological. Several of its kings are mentioned of the names of Gordius and Midas. On the death of Adrastus (b. c. 560) the royal family of Phrygia became extinct, and the kingdom became a province of Lydia. It afterward formed a part of the Persian, and still later of the Roman Empire.

**Phyllopo'oda** ('leaf-footed'), an order of Crustacea, possessing numerous feet, numbering eight pairs at least, the first pair being natatory in character. The feet are of foliaceous or leaf-like structure, and are provided with branchial appendages, adapted to subserve the breathing or respiratory function. The carapace, or shelly covering protecting the head and chest, may be well developed, or the body may be destitute of a covering. In their development the Phyllopoda pass through a metamorphosis; and in their earliest state the embryos appear as in the "nauplius" form.

**Phylloxera**, a genus of plant lice, family Aphidæ, order Hemiptera. The type of the genus is *Phylloxera quercus*, a species which lives upon oak trees; but the *Phylloxera vastatrix*, or grape Phylloxera, a species which injuriously affects the vine, has attracted so much attention of late years that it has come to be known as the Phylloxera. It presents itself in two types, the one gall-inhabiting (*gallicola*), and the other root-inhabiting (*radicola*). Its proper home is North America, where it was known early in the history of grape culture, and where it doubtless existed on wild vines from time immemorial. It was discovered in

## Physical Geography

England in 1863, and about the same time it made its appearance in France, where it committed great ravages, inflicting immense loss upon the owners of vineyards. Widening its area not only by natural means, but also by commerce in vines and cuttings, it was carried from infected to non-infected districts, and spread to Spain, Portugal, Switzerland, Austria, Prussia, and to all the grape-growing countries of Europe. Only where the soil was of a sandy nature did the vineyards escape. In 1885 its presence was discovered in Austria.



Life-history of Phylloxera. A.—winged female; B.—wingless female from the root; C.—under surface of a vine leaf, showing the wart-like galls; D.—an enlarged section of one of the galls, showing the eggs within it; E.—upper surface of a vine leaf, showing the openings of the galls; F.—some of the roots of the vine, showing the nodosities caused by the parasites.

lia, at the Cape of Good Hope, and in Algeria; and, generally speaking, it has now obtained a foothold, at least in restricted localities, in every country where the grapevine is cultivated. Vines attacked by Phylloxera generally show external signs the second year of attack in a sickly yellowish appearance of the foliage and in stunted growth, and the third year they frequently perish, all the finer roots having decayed and wasted away. Many remedies have been proposed, but none are universally practicable or satisfactory.

**Physical Geography** is that branch of geography which treats of the surface of the earth, or of any part of it as regards its natural features and conformation, the changes that are constantly taking place and that have formerly taken place so as to produce the features now existing; it points out the natural divisions of the earth into land and water, continents, islands, rivers, seas, oceans, etc.; treating of the external configuration of mountains, valleys, coasts, etc.; and of the relation and peculiarities of different portions of the water area, including currents, wave-action, depth of the sea, salt- and fresh-water lakes, the drainage of countries, etc. The atmosphere in its larger

## Physick

features is also considered, including the questions of climate, winds, storms, rainfall, and meteorology generally. Lastly it takes up various questions connected with the organic life of the globe, more especially the distribution of animals and plants, and their relation to their environment; tracing the influence of climate, soil, natural barriers or channels of communication, etc., upon the growth and spread of plants and animals, including in the latter the various races of man. The field of physical geography is thus by no means easy to confine within strict limits, as it is so closely connected at various points with geology, mineralogy, botany, and zoology, chemistry, ethnology, etc.

**Physick, PHILIP SING** (1768-1837), surgeon, was b. in Philadelphia, Pa. He graduated at the University of Pennsylvania in 1785. In 1791 was licensed by the Royal College of Surgeons in London. In 1805 was made professor of surgery in University of Pennsylvania. In 1825 was elected member of the French Academy of Medicine, and in 1836 honorary fellow of the Royal Medical and Chirurgical Society of London. One of his most brilliant successes was that of enterotomy on Chief Justice Marshall, which resulted in the removal of over 1,000 calculi and a perfect cure. He introduced numerous valuable instruments and improved modifications of others, and applied novel methods of treatment. He was called the "Father of American Surgery."

**Physics** (or Physical Science) (Gr. *physikos*, "natural"), comprehends in its widest sense all that is classed under the various branches of mixed or applied mathematics, natural philosophy, chemistry, and natural history, which branches include the whole of our knowledge regarding the material universe. In its narrower sense it is equivalent to Natural Philosophy which until of late years was the term more commonly used and denotes all knowledge of the properties of bodies as bodies, or the science of phenomena unaccompanied by essential change in the objects; while chemistry is concerned with the composition of bodies, and the phenomena accompanied by essential change in the objects, and natural history, in its widest sense, includes all the phenomena of the animal, vegetable, and mineral world. See the different articles.

**Physiognomy**, the doctrine which teaches the means of judging of character from the countenance. Aristotle is the first who is known to have made any attempts in physiognomy. He observed that each animal has a special predominant instinct; as, the fox cunning, the wolf ferocity, etc., and he thence concluded that men whose features resemble those of certain animals will have similar qualities to those animals. Baptista della Porta, in his work *De Humana Physiognomia* (1586), revived this theory and carried it out further. The theory was adopted and illustrated by the French painter Lebrun, in the next century, and by Tischbein, a German painter of the eighteenth century. The physiologist Camper sought new data in a com-

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parison of the heads of different types of the human species, and in attempting to deduce the degree of intelligence belonging to each type from the size of the facial angle. Lavater was the first to develop an elaborate system of physiognomy, the scope of which he enlarged so as to include all the relations between the physical and moral nature of man. It is a subject of great interest, but one must be on his guard against a general application of the rules which experience seems to have furnished him.

**Physiology** is the science which treats of the various processes or changes which take place during life in the organs and tissues of a body whether animal or vegetable. We learn from *Embryology* that the human body begins its development as a minute cell or *ovum* about 1-120 of an in. in diameter and consisting of a spherical mass of protoplasm containing a nucleus called the *germinal vesicle*. It is important, therefore, to have a correct knowledge of the nature and activities of the cell, as this constitutes the foundation of physiology. A cell is a nucleated mass of protoplasm of microscopic size. The life principle, the protoplasm, is a semi-fluid, weakly alkaline substance, transparent, generally colorless, and made up of granules of albuminous, fatty, and other material, which exhibits a peculiar vibratory movement called "Brownian movement."

The vital or physiological characteristics of protoplasm are, 1, Power of spontaneous movement. 2, Power of response to stimuli—irritability; (a) Change of temperature; (b) mechanical stimuli; (c) chemical stimuli; (d) Electrical stimuli; (e) Nervous influences. 3, Power of digestion, respiration, and nutrition. 4, Power of growth. 5, Power of reproduction.

The essential feature of living matter is its instability; it is the seat of chemical changes collectively called metabolism. These changes are subdivided into 1, constructive or anabolic, in the course of which non-living matter is annexed or assimilated by living matter; 2, destructive or katabolic, in course of which living matter and storage substances are expended.

Living matter is supplied by food, the potential energy of which is utilized in the course of analytical changes which fall mainly upon the storage substances and involve living substances only to a very small extent. A living body, considered simply as a mass of living matter, possesses a fund of potential energy derived from the previous storage and assimilation of foreign matter. The lowest form of living matter is a simple cell, e. g., *Amoeba*. The highest form is the human body.

In all living organisms a physiological division of labor is associated with an anatomical differentiation of structure. The organism is a community; its individuals are cells; its groups of individuals are organs.

In any animal above the lowest type the following principal tissues are recognized: 1, blood; 2, epithelium; 3, connective tissue; 4, nervous tissue; 5, muscular tissue.

The *functions* attributed to these tissues

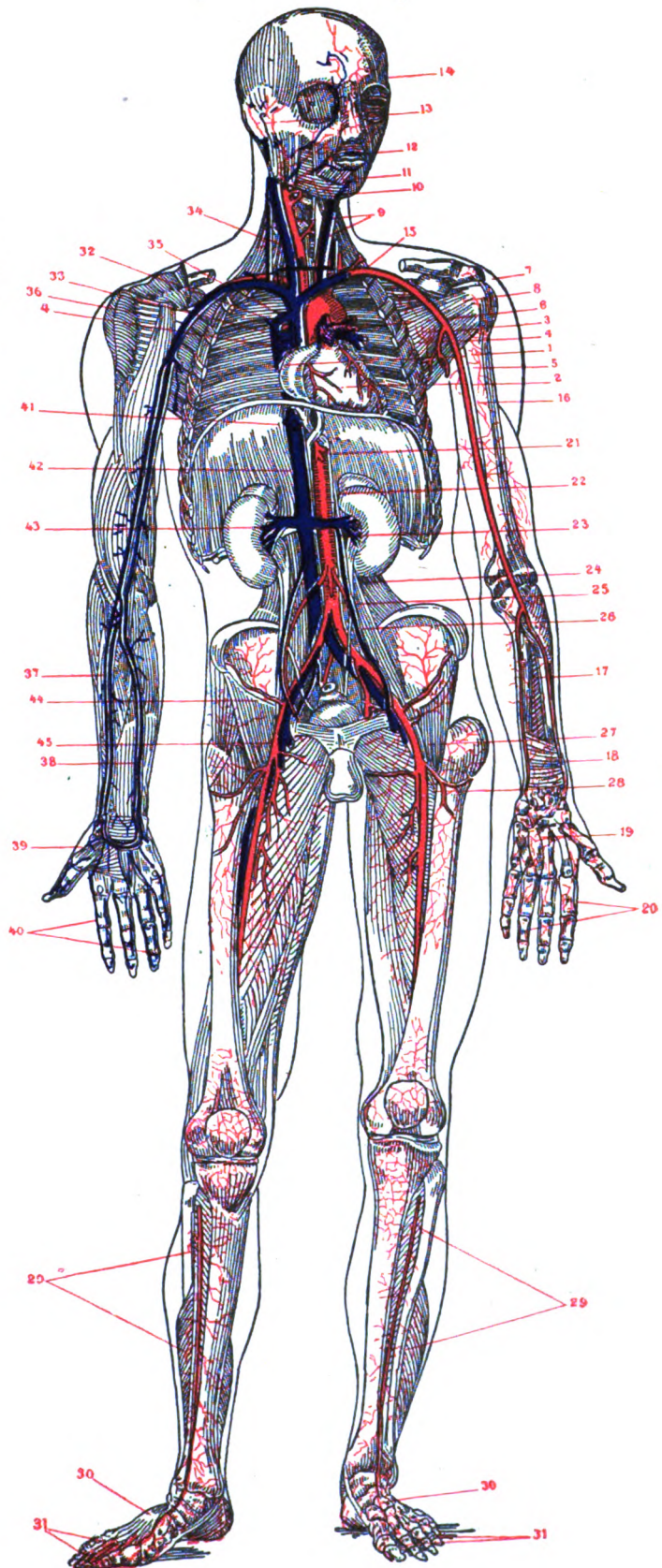


## THE BLOOD VESSELS

*after opening the large cavities of the body and removing the muscles.*

*On the right side the veins are blue; on the left the arteries are red.*

1. Right Auricle.
2. Right Ventricle.
3. Pulmonary Artery.
4. Pulmonary Veins.
5. Left Ventricle.
6. Ascending Aorta.
7. Arch of the Aorta.
8. Descending Aorta.
9. Carotid Artery.
10. Lingual Artery.
11. Internal Maxillary Artery.
12. Labial Artery.
13. Temporal Artery.
14. Supra-Orbital Artery.
15. Subclavian Artery.
16. Brachial Artery.
17. Radial Artery.
18. Ulnar Artery.
19. Superficial Palmar Arch.
20. Digital Artery.
21. Short Abdominal and Superior Mesenteric Artery.
22. Abdominal Aorta.
23. Renal Artery.
24. Inferior Mesenteric Artery.
25. Internal Spermatic Artery.
26. Internal Iliac Artery.
27. Femoral Artery.
28. Deep Femoral Artery.
29. Anterior Tibial Artery.
30. Dorsalis Pedis Artery.
31. Arteries of the Toes.
32. Superior Vena Cava.
33. Azygos Vein.
34. Internal Jugular Vein.
35. Subclavian Vein.
36. Axillary Vein.
37. Radial Vein.
38. Ulnar Vein.
39. Venous Arch (Palmar).
40. Veins of Finger.
41. Portal Vein.
42. Inferior Vena Cava.
43. Renal Vein.
44. Internal Iliac Vein.
45. Femoral Vein.



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## Physiology

are: 1, The distribution of food material and the removal of waste material by the blood. 2, The digestive preparation and absorption of food material and the rejection of waste matter by the epithelium of the secretory and excretory glands. 3, Mechanical support, connection, and preservation of form by the connective tissue. 4, Control of action and communication between parts by the nervous tissue. 5, Internal and external mechanical movements by muscle.

From a physiological point of view we distinguish the following principal organs: 1, of digestion; 2, of respiration; 3, of circulation; 4, of excretion; 5, of reproduction; 6, of movement; 7, of control. These organs are derived from the layers of the embryonic blastoderm, the epiblast, mesoblast, and hypoblast. In studying the functions of the body physiology must call to its aid, anatomy, chemistry, physics, etc. Given a knowledge of these essentials, one can study the physiological processes and consequences by exact observation and by insulative experiments upon the lower and higher animals. The complicated functions of the human body are the highest expression of physiological activity. The functions of the simple protoplasmic cells are its lowest and earliest manifestations.

The essential income of all living matter is made up of the six proximate principles: proteid, fat, carbohydrate, salts, water, and oxygen. The three most important elements which they contain are carbon, nitrogen, and oxygen. At least two-thirds of the body weight is made up of water. With these general considerations in view, we must take up the specific functions of the body.

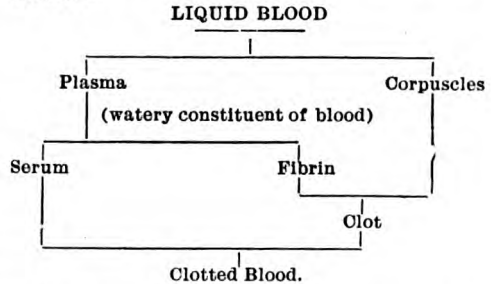
### I, THE BLOOD AND CIRCULATION.

(a) *Blood* is the fluid medium by means of which all the tissues of the body are directly or indirectly nourished; by means of it also, such of the materials resulting from the metabolic processes, as are of no further use in the body economy, are carried to the excretory organs to be removed from the body. A regular supply of healthy blood is an essential condition of the life of the animal body. The quantity of blood in the body holds a definite proportion to the body weight and is from  $\frac{1}{4}$  to  $\frac{1}{5}$  of the entire weight. Blood is a slightly viscid alkaline fluid varying in color from bright scarlet to dark purple. Owing to the presence of sodium chloride blood has a saltish taste and it possesses a faint indescribable odor. The most important characteristic of blood is its coagulability. This is the phenomenon which is observed when blood is drawn, or which may occur in certain pathological conditions in the living body. Left undisturbed for two or three minutes after being drawn the blood becomes more and more viscid; as time goes on a red jelly-like substance results; the jelly shrinks, gets firmer, and squeezes out drops of almost colorless liquid (serum). The clotting is due to the development in the blood of a substance called fibrin, which appears as a meshwork, entangling and enclosing within itself the

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blood corpuscles. Several theories as to the source of this fibrin and as to the essentials for coagulation have been advanced; suffice it to say that the work of Alex Schmidt, Hammarston, Wooldridge, Pekelderling, Lillienfeld, and others has thrown great light upon this subject.

The following diagram may make the point clearer:—



Coagulation is hastened by 1, moderate warmth; 2, rest; 3, contact with foreign matter; 4, free access of air; 5, addition of water (less than twice its bulk). It is retarded by 1, cold; 2, addition of water (more than twice its bulk); 3, addition of neutral salts; 4, contact with living tissue; 5, imperfect aeration; 6, inflammatory states of system; 7, exclusion of air; 8, addition of strong acids and alkalies.

A small drop of blood examined under the microscope, is seen to be composed of a number of corpuscles floating in an invisible fluid, the *plasma*. These corpuscles will be seen to consist of two kinds, 1, colored corpuscles numbering about 5,000,000 to the c.m. and forming about 45 per cent. by weight of the whole mass of blood; 2, colorless corpuscles numbering about 6,000 to the c.m. A description of these corpuscles will not be given here; suffice it to say that the red corpuscles are the agents by which the oxygen, needed by the tissues, is brought to them and the carbon dioxide received in exchange for the oxygen given off. This property of carrying oxygen is inherent in the hemoglobin, the coloring matter of the corpuscle. The white corpuscles are factors in inflammatory processes and in other conditions such as phagocytosis. The number and quantitative composition of these corpuscles do not remain constant in disease, as we may have an excessive reduction in the relative amount of hemoglobin in each corpuscle. These conditions give rise to anemia, etc.

The chemical composition of the blood is quite constant. One hundred gms. of blood consist of 80 gms. of water and 20 gms. of solids (hemoglobin, proteids, carbohydrates, fats, salts, etc.). In solution and in combination in this 100 gms. of blood we find about 60 c.c. of the gases carbon dioxide and oxygen, whose relation, the one to the other, varies according as the blood is arterial or venous. The composition of the blood is affected by 1, age; 2, sex; 3, temperament; 4, pregnancy; 5, diet.

*Circulation of Blood.*—The blood does not remain stagnant, it does not ebb to and fro, it



circulates. This conclusion was not reached until 1628, when Harvey discovered that the blood passes from the left ventricle, through the system, to the right ventricle. Harvey's premises to this conclusion were: 1, the disposition of valves in the veins and in the heart; 2, the pulse in the arteries coincident with the systole of the ventricles; 3, the great size of the minimum volume of blood that must be driven into the arteries within a short space of time; 4, the spurting of blood from the cardiac end of an artery; 5, abundant escape of blood from the peripheral end of a vein; 6, effects of very tight and moderate ligatures of the arm upon vessels of the forearm.

The description of the heart and vessels will not be taken up, as that belongs to the domain of anatomy. In a general way the heart can be considered as consisting of four chambers, two auricles and two ventricles. The arteries lead from the ventricles; the veins lead to the auricles. Outside the heart the blood flows from ventricle to auricle through arteries, capillaries, and veins. Inside the heart the blood flows from auricle to ventricle.

A drop of blood will complete its circulation as follows: 1, Systemic or greater circuit: left auricle—left ventricle—systemic arteries—systemic capillaries—systemic veins—right auricle. 2, Pulmonary or lesser circuit: right ventricle—pulmonary arteries—pulmonary capillaries—pulmonary veins—left auricle.

The human heart contracts with regularity at a rate of about 70 per minute; each contraction or active period is followed by a passive period. Contraction of any part of the heart is called its *systole*. Relaxation of any part of the heart is called its *diastole*. During systole the ventricles contract and empty themselves into the pulmonary artery and aorta; the semi-lunar valves are opened; the auriculo-ventricular valves are shut; the first sound of the heart is produced and is coincident with the carotid pulse. During diastole the ventricles are relaxed; the semi-lunar valves are closed; the auriculo-ventricular valves are open; the blood is flowing from auricles to ventricles; at end of diastole the auricles contract; the second or pulmonic sound is produced at the beginning of diastole. For the importance of these sounds, and for situation, etc., of cardiac impulses physical diagnosis should be consulted. Successive beats of the ventricles drive successive charges of blood into the arteries and produce a pressure of blood within them; the passage into the veins is impeded by the friction of the mass of blood against the walls of the capillaries and by the narrowness of the minute arteries leading into them. This resistance is spoken of as the "peripheral resistance."

The blood pressure is thus the resultant of 1, the heart's force; 2, the peripheral resistance; 3, elasticity of arteries. This is derived from heart's force. The average blood pressure in the human carotid artery is about 15-20 c.m. of mercury. The most characteristic feature of the flow of blood in arteries is its intermittency; and this intermittent flow is

felt as the pulse. The practical value of the pulse consists in the fact that it affords means of judging of the state of the circulation. The frequency of the pulse is about 70 per minute in male, 80 in female, and is increased by exertion, by taking food, by stimulants, by emotion, in fevers, in debilitating disease; it is diminished during rest, during sleep, in cerebral coma, etc. The characters of the pulse are 1, frequency; 2, compressibility. These vary and constitute symptoms of disease.

The force and frequency of contractions of the heart depend upon: 1, properties and conditions of the heart muscle itself; 2, influence of the central nervous system; 3, the amount of blood passing into the heart's cavities; 4, the amount of pressure to be overcome.

The heart muscle possesses the peculiar property of automatic contractility. This property has been the subject of much scientific research, and space will not allow details concerning it. In regard to the influence of the central nervous system it can be said in brief that the heart is under the control of 1, the vagus (pneumogastric) nerve, whose action is to slow, or to inhibit, the beats, and 2, of the sympathetic nerve, whose action produces acceleration of the heart beats.

II. RESPIRATION.—The maintenance of animal life necessitates the continual absorption of oxygen and excretion of carbonic acid. The term respiration is used for the visible act of breathing, and for the invisible gaseous exchanges taking place between the air and a living body. We must distinguish in the complete process of respiration two stages: external respiration or the mechanism of aeration; and internal respiration or the actual exchange of gases which take place in the tissues of the body. The essential function which is the property of every living cell is internal respiration; external respiration is accessory to it.

The process of respiration is divisible into four parts: 1, the mechanism of breathing, viz., the respiratory movements; 2, pulmonary or external respiration, viz., the exchange of gases taking place between the air and the pulmonary blood; 3, systemic or internal respiration, viz., the exchange of gases taking place between arterial blood and lymph or tissue; 4, the chemical changes which take place in living aerated tissue, i. e., the tissue-nutrition of which oxygenation forms part.

A brief summary is as follows: Oxygen, introduced into the lung by muscular movement, diffuses into the pulmonary blood and is conveyed to the systemic capillaries, whence it diffuses into the lymph and tissues; here it enters and forms part of some complex compound which subsequently yields carbon dioxide as a disintegration product; carbon dioxide diffuses from the lymph to the blood, and is therein carried to the lung, whence it diffuses into the air. In ordinary easy breathing a moderate amount of air is taken into the chest with each inspiration and given out with the succeeding expiration. This air is called the tidal air and amounts to about 30 cubic in. Beyond this tidal air it is possible to introduce

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into the chest, by an extraordinary inspiratory effort, a further amount which is termed the "complemental air," and amounts to about 120 cubic in. The supplemental air is that amount which can be expelled by an extraordinary expiratory effort and amounts to about 90 cubic in. After the most complete possible expiration there is left in the lungs a quantity of air called the residual air, and it amounts to about 90 cubic in. The vital capacity is a term used to denote the amount of air which can be given out by the deepest possible expiration after the deepest possible inspiration. This amounts to about 250 cubic in. The capacity of equilibrium or stationary air is the cubic capacity of the chest after normal expiration, and amounts to about 200 cubic in. It is by a rapid diffusion of gases taking place between the stationary and the fresh tidal air that the former discharges carbon dioxide and is replenished with oxygen. Expired air as compared with atmospheric air contains about five per cent. less oxygen (O) and four per cent. more carbon dioxide (C O<sub>2</sub>). It is warmer, saturated with moisture, fouled by organic emanations, and slightly diminished in volume. The minus quantity of oxygen is seen to be greater than the plus quantity of carbon dioxide; with this inequality corresponds the fact that the volume of expired air is slightly less than that of the previously inspired air.

The fraction denoting the ratio

$$\frac{\text{Vol C O}_2 \text{ exhaled}}{\text{Vol O}_2 \text{ absorbed}}$$

is called the respiratory quotient, and normally is about  $\frac{1}{4}$ .

A point of great practical importance relates to organic matter exhaled from the lungs. It is the chief factor in the fouling of the air. A rough guide to amount of respiratory impurity is the sense of smell. One part of C O<sub>2</sub> in 5,000 of air is the limit of expired C O<sub>2</sub> admissible in perfect ventilation. The normal amount of fresh air per head per hour which should be provided in order that air in dwellings should be healthy is about 3,000 cubic feet. The average frequency of respiratory movements is about 15 per minute, but it is variable, depending on sex, age, exercise, emotions, etc. Respiratory movements are characterized by various conditions, e. g., dyspnoea, asphyxia, apnoea, Cheyne-Stokes, breathing, etc.

Direct data relating to internal respiration are readily obtained from muscle, and the following summary will briefly state the facts:—

1. The activity of muscle respiration is determined by the activity of muscle, and not *vice versa*.

2. The consumption of oxygen is determined by the oxygen requirements of tissue, not by the amount of oxygen available.

3. The exhalation of carbon dioxide is the most reliable indicator of muscle respiration.

4. By integration of oxygen, a force-yielding storage substance is formed.

5. By disintegration of this substance (4) carbon dioxide is liberated in company with heat, work, acid, and an alteration of electrical potential.

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The changes which occur in the composition of the blood during its circulation take place in the tissues. The oxygen carried by the hemoglobin of the red corpuscles of the blood is given up to the tissues as the tension of the gas within them is very small. This oxygen thus set free is built up into the protoplasmic molecule and assists in metabolism. The process of katabolism is always attended by the evolution of carbon dioxide; as the blood passes through the tissues the high tension of this C O<sub>2</sub> in the tissues permits of its passage into the blood. Breathing compressed air lowers blood pressure. Breathing in rarefied air raises blood pressure. The movements of normal respiration are automatic and involuntary, but subject to occasional modification by the stimulation of afferent nerves and by voluntary interference.

The nervous mechanism consists of 1, a chief respiratory center in the spinal bulb; 2, afferent nerves (vagus, superior laryngeal, and fifth); 3, efferent nerves to the muscles of respiration. The vagus nerve contains fibers which stimulate inspiration and inhibit expiration, as well as fibers with the reverse effect. The superior laryngeal branch of the vagus inhibits inspiration and stimulates expiration.

III. DIGESTION.—The object of digestion is to bring the materials of the food into such a condition that they may be taken up by the blood and lymphatic vessels and so rendered available for the wants of the system. We see then that digestion is preparatory to absorption. Before absorption the food is outside the body, although in the intestinal canal; after absorption it is in the body, forming part of the nutritive fluids, blood and lymph.

*Foods* may be divided into two classes: 1, *Organic*: (a) nitrogenous substances (proteids) flesh, milk, eggs, etc., and (b) non-nitrogenous (1), starches and sugars; (2), oils and fats. 2, *Inorganic*: (a) mineral and saline matter; (b) liquid food containing chiefly water. Food in the intestine is acted upon by the series of secretions poured out by the glands in the walls of the digestive tract, and by glands (the pancreas and liver), the ducts of which open into that tract. These secretions, which are derived from the blood, are, saliva, gastric juice, bile, pancreatic juice, and succus entericus (intestinal juices), and their respective shares in the entire process are as follows:—

Proteids are digested by the agency of gastric juice and pancreatic juice; fats are digested by the agency of bile and pancreatic juice; starch by the agency of saliva and of pancreatic juice; cane sugar, by the intestinal juice. In all these cases the effect of digestion is to transform indiffusible into diffusible bodies and thus facilitate absorption. Absorption is not physically identical with diffusion, as is shown by the case of cane sugar, which although highly diffusible, does not pass unchanged. Absorption, therefore, depends upon two conditions, firstly, a physical condition—the diffusibility of the digested material; and a physiological condition—the selective activity of the epithelium through which absorp-

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tion is effected. The essential constituent of each digestive fluid is a ferment, ptyalin in saliva, pepsin in gastric juice, trypsin, steapsin, amyllopsin, and rennet in pancreatic juice, invertin in intestinal juice. These are the specific agents by which the digestive transformations of food are effected. They have never been isolated and are recognized to be present only by their effects. The chemical action of the digestive fluids is promoted by mechanical assistance; each mouthful of food is subdivided by mastication and propelled into the stomach by deglutition. The swallowed mass is well mixed with the gastric juice by the muscular action of the stomach wall. Reduced to pulp (chyme) it is squeezed into intestines and propelled onward by peristaltic movement.

### *Specific Action of the Various Secretions.*

1. *Saliva*.—Ordinary saliva is a mixture of the secretions of the parotid, submaxillary, and sublingual glands. The average daily secretion is about 2½ pints. It is composed of water, salts, mucin, serum-albumin, serum-globulin, and contains the ferment, ptyalin. The uses of saliva are mainly mechanical and in a small degree chemical. Saliva is necessary to aid mastication and deglutition, as neither can be performed with the mouth dry. Articulation is also aided by saliva, and the sense of taste is dependent upon saliva in so far as any solid substance must be dissolved before it can be tasted. The chemical action of saliva is the conversion of starch into sugar, and this conversion is brought about by action of the ferment, ptyalin. The secretion of saliva is under control of the nervous system directly by the chorda tympani nerve, which is vasodilator and secreto-motor of water; and by sympathetic nerves, which are vaso-constrictor and secreto-motor of organic matter.

2. *Gastric Juice*.—The secretion of the gastric glands is a colorless fluid containing pepsin and other ferments. Total quantity secreted in 24 hours is about  $\frac{1}{10}$  of body weight; this must not be regarded as discharged from the body. It is re-absorbed in the small intestine. The chief function of the gastric juice is to convert proteids into peptones. This conversion is attended by the formation of several intermediate products and is completed by the formation of hemi- and anti-peptone. These end products have a different action in the body economy and will be discussed under the action of *pancreatic secretion*.

3. *Pancreatic Juice*.—The secretion is a colorless, transparent, slightly viscid liquid. The functions of this secretion are: 1, To convert proteids into peptones by action of the ferment trypsin. The intermediate products are almost the same as in gastric digestion—hemi-peptone and anti-peptone. The pancreatic juice converts the hemi-peptone into leucin and tyrosin; but does not affect the anti-peptone. 2, To convert starch into sugar by action of ferment, amyllopsin. 3, To curdle milk by action of the ferment, rennet. 4, To emulsify oils and saponify fats by action of the ferment, steapsin.

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4. *Bile* is a somewhat viscid fluid of a yellow, reddish yellow, or green color. It contains salts, coloring matter, fatty substances, mucus, gas, etc. Its functions are: 1, it assists in emulsifying the fats, thus rendering them capable of absorption; 2, it facilitates absorption of fatty matter through the intestines by moistening the mucous membrane, 3, antiseptic of intestinal tract; 4, is a natural purgative; 5, it precipitates the gastric proteoses and peptones; 6, it is an encrementitious substance.

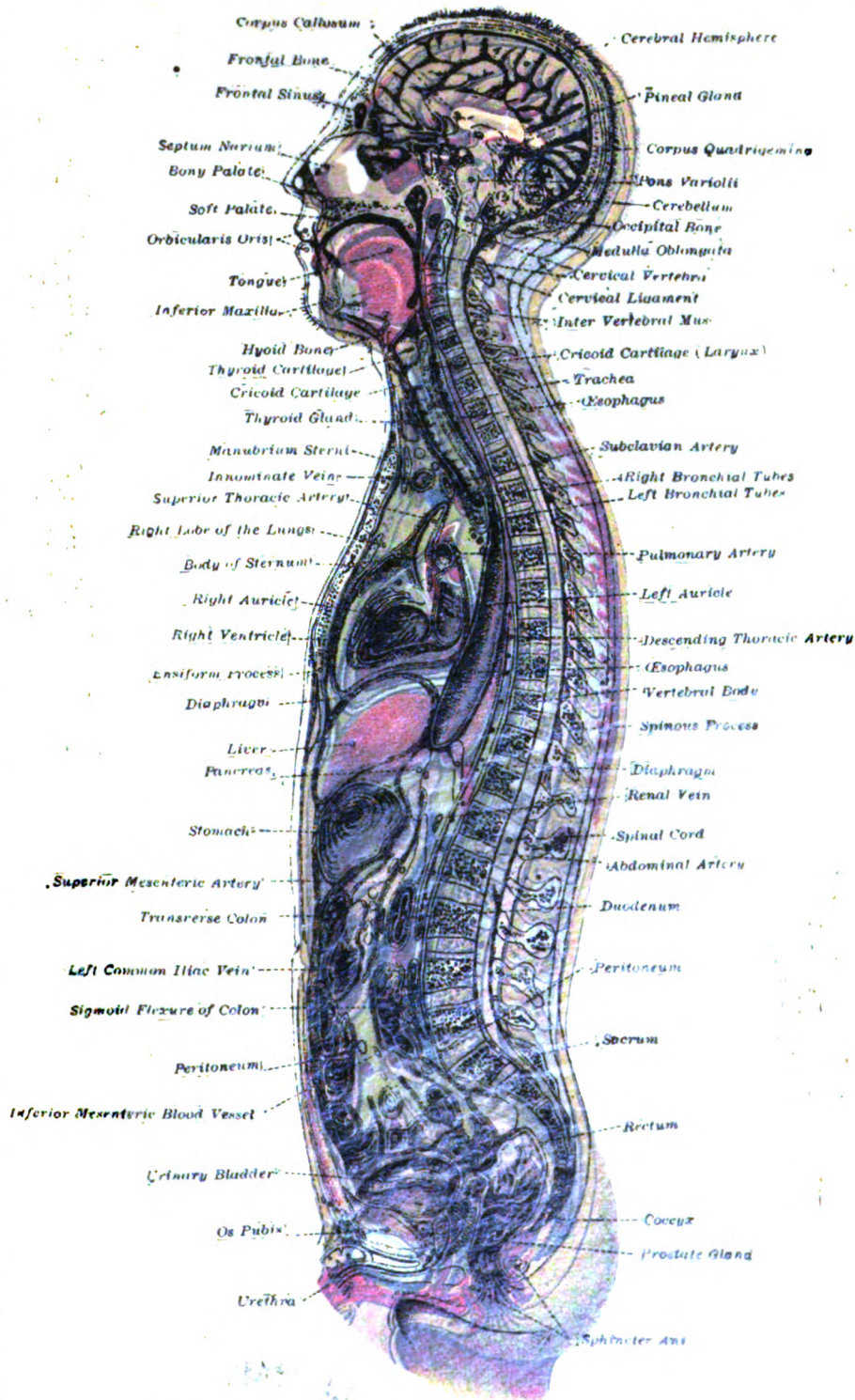
5. *Intestinal Juice (succus entericus)*.—It is a yellowish alkaline liquid. It converts proteids into peptones, and starch into sugar, probably by action of the ferment, invertin. The evidence in favor of the action of the intestinal juice is quite insufficient to rely upon.

Summary of digestive changes in small intestines. The thin chyme, which, during the whole period of gastric digestion is being constantly squeezed into duodenum, consists of albuminous matter, fatty matter, starch, sugar, gastric juice, other fluids, etc. The special functions of small intestine in order are: 1, To alter fat so as to make it capable of digestion. This is done by saponification and emulsification. 2, To digest albuminous matter by pancreatic juice. 3, To convert starch into sugar. 4, Absorption of saline and saccharine matter.

IV. *EXCRETION*.—Respiration, digestion, circulation, and excretion are the agencies through which the blood is maintained of such quality and composition that it serves through life as the vehicle of nourishment and of purification to the whole body. Respiration is essentially a process of exchange, formed by a double current of gases, of incoming oxygen, and of outgoing carbon dioxide. Digestion and excretion similarly constitute a process of exchange, in which the two currents run in separate channels; carbon and nitrogen entering the body by intestinal absorption, but nitrogen leaving the body by renal excretion as urea, and carbon by respiratory excretion as carbon dioxide. The principal excretions are those due to the action of 1, lungs in excreting CO<sub>2</sub> and organic matter; 2, kidneys in excreting urea, etc.; 3, sweat glands of skin in excreting various products; 4, intestinal canal in excreting various unabsorbed products of defecation. The excretion of CO<sub>2</sub> by the lungs has been discussed under respiration, and it must be borne in mind that this excretion of CO<sub>2</sub> is attended by an intake of oxygen.

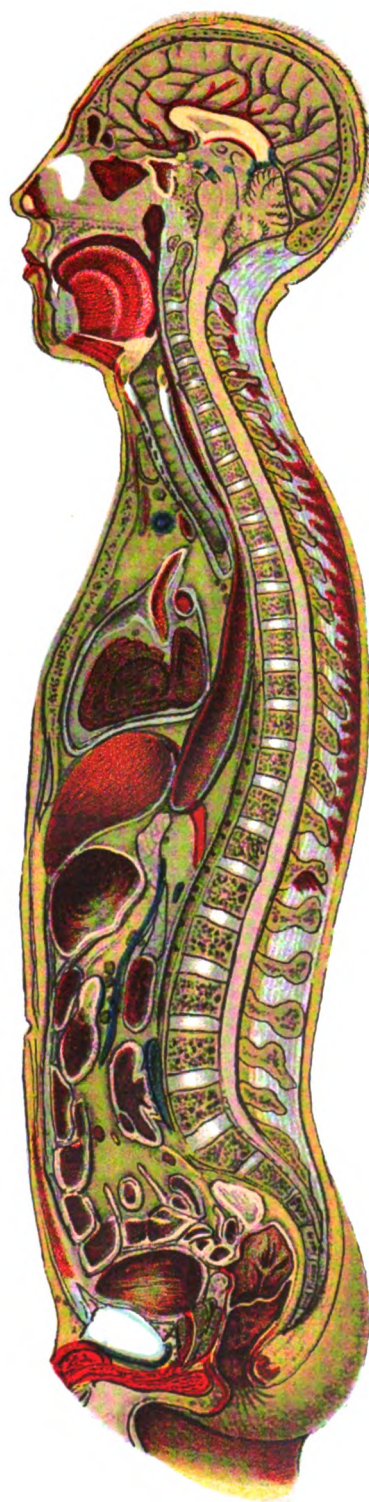
*Renal Excretion*.—The structure of the kidneys is discussed under anatomy, but it is to be remembered that the arrangement of vessels and of excretory epithelium is such as to give the best opportunity for proper and complete elimination of waste products. The excretion or secretion of the kidneys is called *urine*; the average daily amount secreted is about 50 ounces. Urine is a transparent amber-colored liquid, of acid reaction, and a specific gravity of 1.015–1.025. It consists of water holding in solution certain organic matter (as urea, uric acid, kreatinin, xanthin, hippuric acid, etc.) and saline material (as phosphates, chlorides, sul-















phates, etc.) as its ordinary constituents; but in diseased conditions it may contain albumin, blood, sugar, bile, etc., in large quantities. The determination of the constituents of urine is one of the most important aids to diagnosis of certain conditions, and a thorough chemical, microscopical, and bacteriological examination of urine should always be made in cases of infectious diseases, diabetes, Bright's disease, etc.

The secretion of urine is an active process, not a passive filtration. The anatomical disposition of the renal vessels is such as to suggest filtration under high pressure at the glomeruli, secretion under low pressure by the convoluted tubules.

The renal action is supposed to consist of two processes: 1, Of filtration, by which water and ready formed salts are eliminated. This part of the renal function is performed in the Malpighian corpuscles by the renal glomeruli. The amount of fluid filtered depends upon the blood pressure in the glomeruli. All the causes which increase blood pressure will secondarily increase the secretion of urine. 2, Of secretion, by which certain substances forming the chief and more important part of the urinary solids are removed from the blood. It is to be remembered that the convoluted portions of the kidney tubules are lined with an epithelium which bears a close resemblance to the secretory epithelium of other glands, and that the Malpighian corpuscles and portions of the loops of Heule are lined by simple flattened epithelium.

As to the functions of the different parts of the uriniferous tubules two chief theories have been brought forward. (a) The cells of the convoluted tubes, by a process of true secretion, separate from the blood substances such as urea, whereas from the glomeruli are separated water and inorganic salts (Bowman, 1842). (b) In the glomeruli are filtered off from the blood all the constituents of the urine in a very diluted condition. This diluted urine, passing along the uriniferous tubules, is deprived of part of its water by absorption and thus becomes concentrated (Ludwig, 1844).

As each portion of urine is secreted it sends that which is already in the uriniferous tubes onward into the pelvis of the kidney. Thence through the ureter the urine passes into the bladder and thence by the muscular contraction of the walls of the bladder the urine passes on through the urethra and thus is excreted.

*Excretory Action of the Skin.*—The skin serves as: 1, an external integument for the protection of the deeper tissues; 2, a sensitive organ in the exercise of touch; 3, an important excretory and secretory organ; 4, an absorbing organ; 5, a regulator of the body temperature.

The skin, by virtue of its glands is an excretory organ. The substance excreted is almost exclusively water. The amount discharged varies. The excretion is called *sweat* and is usually formed so gradually that the watery portion escapes by evaporation as fast as it reaches the surface. The terms perspira-

tion and sweat are used synonymously but a distinction is often made in that perspiration includes all that portion of the secretions of the skin that pass off by evaporation, or invisible perspiration; while sweat includes that which may be collected only in drops of fluid on the surface of the skin; this latter is termed sensible perspiration.

V. FOOD AND NUTRITION.—The living body yields energy in the form of work and heat. This result is brought about by chemical action. Matter is used up and becomes useless. Consumption of matter is thus a primary condition of vital activity, and it is necessary to the continuance of life that new matter should take the place of spent matter.

The foods, proteids, fats, and carbohydrates supply the necessary new matter, and are the primary source of all body energy. The essential waste products are urea and carbon dioxide. The essential elements in these waste products as well as in the food are nitrogen and carbon. Nitrogen enters the body in proteid and leaves it in urea. Proteid, by gastric and pancreatic digestion, becomes peptone, which is absorbed and retransformed into the proteids of plasma and lymph. These fluids surround and permeate the organized tissues, and the proteid that they carry forms the floating balance of nutritive material from which the fixed portion of living protoplasm is supplied. Of this free or circulating proteid only a small amount is actually taken into chemical combination in protoplasm as fixed or organ proteid, and the greater part of it is acted upon and used by living protoplasm. If a superfluous amount of proteid be taken into the body by the food the excess is converted into leucin and tyrosin, which being absorbed by the portal system is converted into urea by the agency of the liver. Thus to sum up, there are three roads from proteid, as taken into the body, to urea as excreted: 1, by leucin and tyrosin; 2, by circulating proteid; 3, by circulating and organ proteid.

Carbon enters the body in fat and in carbohydrates and leaves it in carbon dioxide. Some carbon enters the body in proteid and some hydrogen from fat leaves the body in water.

The intermediate stages between fat, starch, and sugar on the one hand, and carbon dioxide on the other are: 1, Carbon in proteid may become carbon dioxide immediately by the disintegration of proteid, or immediately after the previous formation of fat or of glycogen proteid. 2, Fat absorbed can exist in the body only as fat, and cannot give rise to proteid or to carbohydrates. The destiny of fat, whether recently absorbed, or previously deposited, is to be oxidized, yielding  $C O_2$  and  $H_2 O$  (pure water) as its final products. Absorbed fat may thus be immediately oxidized or may be stored in the body to be oxidized when required. 3, Carbohydrates may be immediately absorbed and oxidized, yielding  $C O_2$  or may be stored as a comparatively temporary reserve of glycogen in the liver.

The average daily discharge of a man weigh-

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ing 150 pounds is, carbon, 230 grammes; nitrogen, 15 grammes. While the weight and health remain constant this daily export must be made good by an exactly equal import of carbon and of nitrogen in food. This condition is known as the state of *nitrogenous equilibrium*. The departures from this state of equi-poised normal nutrition may be summed up as follows: 1, Gain or loss of nitrogen signifies gain or loss of flesh. 2, Gain or loss of carbon signifies gain or loss of fat. The condition of starvation necessarily follows where we have an increase of export over import. It is absolutely necessary that human food should include proteids, fats, and carbohydrates as well as salts, oxygen, and water. The absence of any of these proximate principles kills by starvation. An adequate diet should consist of 2 grammes of proteid, 1.5 grammes of fat, 6 grammes carbohydrate, 5 grammes salt per one kilogramme of body weight. The chief conditions modifying the amount of diet are: 1, work, 2, health, 3, age. To properly estimate the nourishing value of a food we must take into account its palatability and digestibility as well as its percentage of carbon and nitrogen.

**VI. ANIMAL HEAT.** — One of the most important results of the metabolism of the tissues is the production of the heat of the body. All animals are, as a rule, warmer than the air or water by which they are surrounded. Warm-blooded animals exhibit this excess of temperature to a far greater degree than cold-blooded animals, and whereas the temperature of the former varies little with large variations of the surrounding temperature, that of the latter varies considerably with this circumstance. The warm-blooded animal keeps at a constant temperature by reflex actions of a peculiar character, regulating the heat that is produced in the substance of the body, and the heat that is lost from the surface of the body; the cold-blooded animal has no such regulating power, and, consequently, no fixed or normal body temperature. The average temperature of the human body in those internal parts which are most easily accessible is from 98.5° to 99.5° F. This temperature is subject to variation according to age, sex, period of the day, exercise, climate and season, food and drink taken, disease, etc. The heat which is produced in the body arises from the metabolic changes of the tissues, the chief part of which are of the nature of oxidation. All chemical action taking place in the body is originally derived from food. Heat is dissipated by radiation and by evaporation from the surface of the body, only a small fraction (about  $\frac{1}{5}$ ) of the total goes in the discharge of warm air and warm urine. In hot weather the skin is flushed with blood and moist with perspiration and superfluous clothing is put off; in cold weather the skin is pale and dry and extra clothing is put on. If heat production be diminished the consequence is, of course, a diminution of heat dissipation.

The heat-producing tissues are: 1, muscles; 2, secreting glands; 3, brain. The loss of heat from the body is principally regulated by the

## Physiology

amount given off; 1, by radiation and conduction from its surface; 2, by constant evaporation of water from surface; 3, from air passages; 4, by warming cold foods. We must remember that the influence of the nervous system in modifying the production of heat is very important, as upon this influence depends the amount of the metabolism of the tissues.

**VII. THE NERVOUS SYSTEM.**—Protoplasm is excitable. With higher organization of a mass of protoplasm, differences of function and of structure begin to make their appearance. The progressive elaboration of a nervous system with subdivision of function has its highest expression in the human brain. There is in the human brain a localization of function in different parts. This localization is best known in the cases of language, of voluntary motion and of sight, and, as regards voluntary motion in particular, it is possible to trace a correspondence between particular movements and the functional activity of special areas of the cerebral cortex. The central nervous cell is usually considered as a double cell, one part of which is at the central end of an efferent fiber. The first is called a sensory cell, the second a motor cell. These parts form a reflex arc and may be classified as central, peripheral, and intermediate. The central part is a nerve center or centers, the peripheral parts are the sensory organs and muscles, and the intermediate parts are the nerves, afferent and efferent.

The nervous system consists of the following parts: 1, Large masses of nervous matter situated within the bony cranium and spinal column, and constituting the brain and spinal cord. 2, Smaller masses of nervous matter constituting the sympathetic ganglia. 3, Cords of nerve fibers which connect the central nervous system with the periphery and the sympathetic ganglia. 4, Peripheral end organs. The office of nerve fibers is to conduct impressions. These nerve fibers may be stimulated to act by anything which, with sufficient suddenness, increases their irritability. They are incapable of originating of themselves the conditions necessary for the manifestation of their own energy. The effect of a stimulus upon a nerve depends upon the nature of its end organ. The velocity of a nerve impulse is 111 ft. per second in motor nerves, and 140 ft. per second in sensory nerves.

Cerebro-spinal system is composed of, 1, spinal cord and its nerves; 2, the brain made up of a cerebrum, crura cerebri, pons Varolii, cerebellum, medulla oblongata, etc. All these parts are nerve centers in contradistinction to the nerve trunks. The cerebro-spinal centers are distinguished from mere trunks by the possession of nerve cells, and the increase of function in the centers is, doubtless, due to the possession of ganglion cells.

Functions of nerve centers are: 1, *Reflex action*. A reflex is an immediate unchosen response to a peripheral stimulus. The relations between stimulus and effect are expressed by Pflüger's (1) Law of unilateral reflection; (2)



## Physiology

Law of symmetrical reflection; (3) Law of intensity; and (4) Law of radiation. 2, *Automatism*. An automatic act is a repeated or rhythmic involuntary response to a repeated excitation. 3, *Inhibition and augmentation*. The descriptive anatomy of all the parts of the nervous system cannot be discussed here.

The brief account of function of spinal cord, etc., is: 1, Conduction—(a) Sensory impressions; (b) Motor impressions. 2, Reflex action—Cutaneous and muscle reflexes. 3, Special centers located in cord—Ano-spinal center; Vesico-spinal center; Genito-spinal center; Parturition center, etc.

The functions of the Medulla Oblongata; 1, Conduction; 2, Reflex action; 3, Special centers—(a) Simple reflex centers—mastication, deglutition, coughing, vomiting, etc. (b) Automatic centers—Respiratory center, Cardio-inhibitory center, Vaso-motor center, etc. (c) Control centers. (d) Tonic centers.

A brief conception of the *fundamental structure of the nervous system* is as follows: The nervous system is a combination of an immense number of units called *neurons*, composed of a cell body, of a protoplasmic process called a dendron and an axis cylinder process. The nutrition of the neurons depends upon the condition of the cell body. No neuron has an actual connection with any other, that is, there is no actual connection or continuity of their protoplasmic processes. Nervous impulses are transmitted from one neuron to the other by proximity or contact of parts. The protoplasmic processes conduct impulses to the cells and the axis cylinder processes conduct them away. The axis cylinder process after leaving the cell gives off at right angles lateral branches called collaterals, which split up into fine fibers forming the end brushes or arborizations. The processes run for the most part in the white matter of the brain and cord while the cell bodies of the neurons are collected together in the gray matter.

VIII. THE SENSES.—Through the medium of the nervous system the mind obtains a knowledge of the existence both of the various parts of the body and of the external world. This knowledge is based upon sensations resulting from the stimulation of certain centers in the brain. Under normal circumstances the following structures are necessary for sensation: 1, peripheral organ for the reception of the impression; 2, a nerve for conducting this impression; 3, a nerve center for preserving it.

Sensations may be classified as: 1, common; 2, special.

*Common Sensation*.—Under this head fall all those general sensations which cannot be distinctly localized in any particular part of the body, such as fatigue, discomfort, faintness, hunger, thirst, pain, etc. In this class of common sensations must also be placed the various irritations of the mucous membrane of the bronchi giving rise to coughing; also the sensations derived from various viscera; also sensations of itching, creeping, tingling, aching, burning, etc.

## Physiology

*Special Sensations*.—Touch, taste, smell, hearing, sight. The most important distinction between common and special sensation is that by the former we are made aware of certain conditions of various parts of our bodies, while from the latter we gain our knowledge of the external world also. It must be remembered that the sensorium or seat of sensation is in the brain and not in the particular organ through which the sensory impression is received.

*Touch*. Touch should be considered as a mere modification of common sensation. All parts of the body supplied with sensory nerves are, in some degree, organs of touch; yet the sense is exercised with perfection only in the parts the sensibility of which is extremely delicate, e.g., skin, tongue, lips, etc. Varieties of sense: (a) sense of touch proper, tactile sensibility; (b) temperature; (c) pain.

*Taste*. Conditions of perceptions of taste are: 1, Presence of a nerve and a nerve center; 2, The excitation of the nerve by sapid matters, which must be in a state of solution; 3, A temperature of about 95°–100° F. The principal seat of this sense is the tongue, but the soft palate, uvula, and tonsils are endowed with this sense. Varieties of taste: sweet and bitter; acid; alkaline; metallic.

*Smell*. Conditions necessary: 1, Special nerve and nerve terminations; 2, Mucous membrane of nasal cavity must be moist; 3, Odorous matter must be transmitted in a current through the nostrils. The sense of smell can discern the presence of almost infinitesimal quantities of a substance, thus 3–100,000,000 of a grain of musk can be distinctly smelled.

*Hearing*. The anatomy of the special sense organs will be found under the article on *Anatomy*. All the acoustic contrivances of the organ of hearing are means for conducting sound. The whole development of the organ has for its object merely the rendering more perfect the propagation of the sonorous vibrations and their multiplication by resonance.

The external auditory passages influence the propagation of sound to the tympanum in three ways: 1, by causing the sonorous undulations, entering directly from the atmosphere, to be transmitted by the air in the passage immediately to the *membrana tympani*. 2, By the walls of the passage conducting the undulations imparted to the external ear itself, by the shortest path to the attachment of the *membrana tympani*. 3, By the resonance of the column of air contained within the passage.

*Sight*. The optical apparatus may be supposed to consist of several parts: 1, Of a system of refracting surfaces and media by which images of external objects are brought to a focus upon the back of the eye. 2, Of a sensitive screen, the retina, which is a specialized termination of the optic nerve, capable of being stimulated by luminous objects, and of sending through the optic nerve such impressions as to produce in the brain visual sensations. 3, An apparatus for focusing objects at different distances from the eye (accommodation). 4, System of muscles by which the

## Piacenza

eye is turned. Defects in the optical apparatus cause *Myopia* (short-sightedness); *Hypermetropia* (long-sightedness); *Astigmatism* (greater curvature of the eye in one meridian than in others); Spherical Aberration; Chromatic Aberration, etc. R. W. WEBSTER.

**Piacenza** (pyá-chen'tsá), a town of North Italy, capital of province of same name, nearly equidistant from Parma and Milan at the confluence of the Trebbia with the Po. Piacenza is an important railway center. The manufactures consist of cotton goods, woolens, stockings, hats, leather, etc., and there are also several silk-spinning and paper mills. Piacenza was originally a Roman colony and was founded in 219 B. C. Pop. 34,987. The province belongs to the basin of the Po, and is generally fertile; area 965 sq. mi.; pop. 226,717.

**Pianoforte** (or Piano), a musical stringed instrument, the strings of which are extended over bridges rising on the sounding board, and are made to vibrate by means of small felted *hammers*, which are put in motion by *keys*, and where a continual sound is not intended to be produced have their sound deadened immediately after the touch of the keys by means of leathern *dampers*. Its name is compounded of two Italian words signifying soft and strong, and it was so called in contradistinction to the harpsichord, the instrument which it superseded; and which did not permit of the strength of the notes being increased and diminished at will. The mechanism by which the movement of the keys is conveyed to the strings is called the *action*, and there is no part of the pianoforte in which the variations are more numerous. There are usually three strings in the pianoforte for each note in the higher and middle octaves, two in the lower, and one in the lowest notes. The strings are of steel wire. The lowest notes have their strings wound round with a double coil of brass wire, and those next above with a single coil. Pianofortes are either in the form of the grand piano, in which the strings lie in the direction of the keys, or they have the strings stretched vertically perpendicular to the keys, which is now the most common form, and constitutes the upright piano. Recently a variety called the upright grand has also been introduced. Grand pianos are used as concert instruments, and have the greatest compass and strength. The common compass of the piano at present is six and seven eighths or seven octaves. The invention of the pianoforte can scarcely be ascribed to any one man in particular. The first satisfactory hammer action appears to have been invented by an Italian of Padua, named Bartolommeo Cristofali, about 1711. The instrument was not introduced into England till the latter half of the eighteenth century. Among the principal improvers of the pianoforte are Sebastian Erard, the founder of the celebrated firm still in existence; Roller et Blanchet, the French firm which introduced the upright piano; Broadwood, Collard, Hopkinson, Kirkman, Bechstein, Steinway, besides others.

**Plaz' za** (Italian). in architecture, is a square

## Pierce

or other open space surrounded by buildings. The term is frequently, but improperly, used to signify an arcaded or colonaded walk.

**Pichegru** (pêsh-grü), CHARLES (1761-1804), French general, b. at Arbois, department of Jura. He was for some time a tutor at the College of Brienne, but soon exchanged this profession for that of a soldier. After the outbreak of the French Revolution he rose rapidly; was commander in chief of the army of the Rhine in 1793; and of the army of the north in 1794; subjugated Holland, and entered Amsterdam in January, 1795. Pichegru was now at the height of his fame, and was honored by the Convention with the title of savior of his country. But afterward he was transported to Cayenne. The year following he escaped to England, where he entered into a conspiracy with George Cadoudal to assassinate Napoleon. Having gone to Paris for that purpose, he was captured by the police, and committed to the Temple prison, where he was found strangled.

**Pickles**, vegetables and certain fruits first steeped in strong brine, and then preserved in close vessels. Wood vinegar is often used, but malt or wine vinegar produces the best pickles. Owing to the corroding effects of brine and vinegar the use of metallic vessels should be avoided in making pickles. To give a green color to pickles verdigris or other poisonous compounds of copper is sometimes employed by manufacturers.

**Picts**, the name given to the ancient Caledonians, who inhabited North Britain till the beginning of the sixth century, usually regarded as a Celtic race, though some consider them to have been not even Aryans, but Turanians.

**Piedecuesta** (pi-ã-de-ky-es'tá), a town of the republic of Colombia, on the Rio de Oro, with a university. Pop. 9,015.

**Piedmont**, a department or territorial division of Italy, between Switzerland, Lombardy, Liguria, and France; area 11,198 sq. mi.; pop. 3,233,431. It forms the upper valley of the river Po, and derives its name, signifying "foot of the mountain," from its situation at the base of the loftiest ranges of the Alps, by which it is enclosed on all sides except toward the Lombard plain. It forms one of the most beautiful and fertile portions of Europe, commencing on the north, south, and west in majestic mountains, and thence descending in magnificent terraces and finally undulating slopes to the rich plains of the Po, to the basin of which it all belongs. It is divided into four provinces—Turin, Alessandria, Cuneo, and Novara. The chief town is Turin.

**Pier**, in architecture, is the name applied to a mass of masonry between openings in a wall, such as doors, windows, etc. The solid support from which an arch springs or which sustains a tower is also called a pier. The term is also applied to a mole or jetty carried out into the sea, intended to serve as an embankment to protect vessels from the open sea, and to form a harbor.

**Pierce**, FRANKLIN fourteenth president of

## Pierre

the United States; born at Hillsborough, N. H., Nov. 23, 1804; educated at Bowdoin College, where he was an associate of Nathaniel Hawthorne, who became his lifelong friend. Pierce was admitted to the bar in 1827 and began practice in his native town. He represented his town in the legislature, 1827-33; was representative in congress, 1833-37; and United States senator, 1837-42. He was an ardent advocate of the annexation of Texas, and declined a position in Polk's cabinet to take part in the Mexican War, where he rose to the rank of brigadier-general. He was president of the New Hampshire constitutional convention, 1850-51. It is conceded that his war record led to his nomination and election to the presidency in 1852. At this election Pierce received 254 electoral votes to 42 for Gen. Winfield Scott, the Whig candidate. Pierce's administration was a period of political turmoil. The agitation of the slavery question which culminated in the succeeding administration led to bitter feeling in congress and in the slave and free states. During the administration, the Missouri Compromise was repealed, the Kansas-Nebraska Bill was passed and the boundary between the United States and Texas settled by the Gadsden Purchase. The important events with foreign nations were Perry's treaty with Japan and the Walker filibustering expedition to Nicaragua. Mr. Pierce died Oct. 8, 1869. He was an ardent advocate of the State rights doctrine, and during the war of 1861-65, sympathized with the Southern states.

**Pierre** (pi-är), Sr., a small island near the southern coast of Newfoundland, forming with the adjacent island of Miquelon a colony of France. The inhabitants subsist entirely by the cod fisheries and the industries connected with them. The islands of St. Pierre and Miquelon were first acquired by the French in 1763; and were finally confirmed to them at the general Peace of 1814. Area 90 sq. mi.; pop. 6,300.

**Piezom'eter**, an instrument for measuring the compression of water and other liquids under pressure. In Oersted's piezometer the pressure is gauged by the manometer, and the amount of compression indicated by mercury in a glass tube.

**Pigeon**, the common name of a group of birds, forming in some systems a section of the order of rasorial or gallinaceous birds, in others a distinct order. The pigeons or doves as a group have the upper mandible arched toward its apex, and of horny consistence; a second curve exists at its base, where there is a cartilaginous plate or piece through which the nostrils pass. The crop is of large size. The pigeons are generally strong on the wing, they are mostly arboreal in habits, perching upon trees, and building their nests in elevated situations. Both sexes incubate; and these birds generally pair for life; the loss or death of a mate being in many cases apparently mourned and grieved over, and the survivor frequently refusing to be consoled by another mate. The song consists of the well-known

## Pike

plaintive *cooing*. The pigeons are distributed in every quarter of the globe, but attain the greatest luxuriance of plumage in warm and tropical regions. The pigeon family is divided into various groups. The true pigeons or *Columbidae* are represented by the stock dove, the common wild pigeon, from which, it was once supposed, most of the beautiful varieties of the *Columbidae*, which in a state of domestication are dependent upon man, derived their origin; but it is now believed the rock dove is the parent stock. The passenger pigeon is very abundant in North America. The numbers that sometimes move together are vast beyond conception. Millions of these pigeons associate together in a single roost. The house pigeons, tumblers, fantails, pouters, carriers, and jacobins are the chief varieties of the rock pigeon, and have been employed by Darwin to illustrate many of the points involved in his theory of "descent by natural selection."

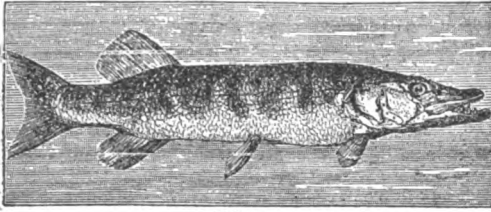
**Pigments**, materials used for imparting color, especially in painting, but also in dyeing or otherwise. The coloring substances used as paints are partly artificial and partly natural productions. They are derived principally from the mineral kingdom; and even when animal or vegetable substances are used for coloring they are nearly always united with a mineral substance. In painting the colors are ground, and applied by means of some liquid, which dries up without changing them. The difference of the vehicle used with the method of employing it has given rise to the modes of painting in water colors, oil colors, in fresco, in distemper, etc. For oil painting mineral substances are more suitable than *lakes* prepared with minerals, because the latter become darker by being mixed with oil. The *lake* colors have tin or alum for their basis, and owe their tint to animal or vegetable coloring substances. Indigo is a purely vegetable color, as is also blue black, which is obtained from burned vine twigs. Ivory black is a purely animal color, being nothing else than burned ivory. In staining porcelain and glass the metallic colors which are not driven off by heat and are not easily changeable are used.

**Pike**, a genus of fishes belonging to the order Teleostei, and included in the Malacopterus division of the order. The pikes form the types of the family Esocidae, in which group the body is lengthened, flattened on the back, and tapering abruptly toward the tail. One dorsal fin exists, this structure being placed far back on the body, and opposite the anal fin. The lower jaw projects. Teeth are present in plentiful array, and are borne by almost every bone entering into the composition of the mouth. The common pike occurs in the rivers of Europe and North America. It is fished chiefly for the sake of its flesh, which is accounted exceedingly wholesome. The pikes are very long-lived, and form the tyrants of their sphere, being the most voracious of freshwater fishes. When fully grown the pike may attain a length of 5 or 6 ft., and there are numerous instances on record in which these



## Pike Perch

fishes have greatly exceeded that length. The sea pikes, also known as gar pikes, are also included in the family Esocidae. The saury pike resembles the gar pike in general conformation, but possesses the dorsal and anal fins in



Pike.

the shape of a number of divided "finlets." The bony pike of North American lakes and rivers belongs to an entirely different order of fishes—that of the Ganoidei.

**Pike Perch**, a genus of fishes closely allied to the perch, but showing a resemblance to the pike in its elongated body and head. Like the pike, it is a dangerous enemy to other freshwater fishes, but the flavor of its flesh is excellent. In Europe it occurs in two species. It also occurs in the fresh waters of the Great Lakes, the Upper Mississippi, and the Ohio.

**Pike's Peak**, one of the highest summits of the Rocky Mountains (14,134 ft.), in the center of the state of Colorado. It was discovered by General Pike in 1806. It abounds in rich gold-bearing quartz, and has a meteorological observatory. A rack-rail line of railway, 9 mi. long, to the top of the mountain has been completed.

**Pilas'ter**, a square pillar projecting from a pier or a wall to the extent of from one fourth to one third of its breadth. Pilasters originated in Grecian architecture. In Roman they were sometimes tapered like columns and finished with capitals modeled after the order with which they were used. See *Column*.



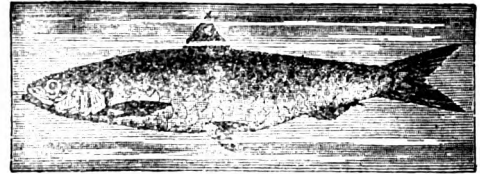
Pilaster.

**Pilate**, PONTIUS, the sixth Roman procurator of Judea. He succeeded Valerius Gratus in A.D. 26. Nothing is known of his early history. He was a narrow-minded and impolitic governor, and at the very beginning of his term of office led to commotions among the Jews at Jerusalem. When Christ had been condemned to death by the Jewish priests, who had no power of inflicting capital punishments, he was carried by them to Pilate to be executed. Yielding to the clamors of the Jews the Roman governor ordered Jesus to be executed, but permitted Joseph of Arimathea to take his body and bury it. Pilate was afterward removed from his office by Vitellius, prefect of Syria (A.D. 36), and, according to tradition, was banished by Caligula to Vienna (Vienne), in Gaul, where he is said to have died or committed suicide some years after.

## Pilbhit

**Pila'tus**, MOUNT, a mountain in Switzerland, on the borders of the cantons of Lucerne and Unterwalden. Its loftiest peak, the Tomlishorn, attains a height of 7,116 ft. A railway to the summit was opened in 1889.

**Pil'chard**, a species of fishes included in the family and genus of the herrings (Clupeidae), which they much resemble, though rather smaller. They frequent the coasts of Britain all the year round. The usual spawning time is October. They are found in greatest plenty on the southern coasts of England, the Cornwall pilchard fisheries being those best known and most celebrated. Pilchards are chiefly consumed in Spain, Italy, and France during Lent and other fasting seasons. Many



Pilchard.

of the commercial "sardines" are in reality young pilchards, the sardine (which see) being also included in the herring genus.

**Pilcoma'yo**, a river in South America, which rises in Bolivia, on the eastern declivities of the Andes, and falls into the Paraguay, near Asuncion, after forming the boundary between Paraguay and the Argentine Republic. Its entire length is between 1,500 and 1,600 mi. On account of its shallowness during the dry season and the great current in its narrow parts it does not appear likely to become usefully navigable.

**Piles**, in works of engineering, are used either for temporary purposes or to form a basis for permanent structures. In the former case they are usually squared logs of wood sharpened at the point, which is sometimes protected with an iron shoe to enable it to penetrate the harder strata which it may meet with in being driven into the ground. The most usual purpose to which piles are applied in temporary structures is to make coffer-dams. The permanent purposes for which piles are employed are various. In many cases the object is to secure a firm foundation in a loose or swampy soil. In these cases the piles used are now often of cast iron, sometimes solid and sometimes hollow. Piles are driven in by a heavy block raised and let fall alternately, this in extensive works being accomplished by means of steam machinery.

**Pilgrim Fathers**, the name given to the English, Scotch, and Dutch Nonconformists who, sailing from Southampton in the *Mayflower*, landed at what is now Plymouth, Mass., December, 1620, and colonized New England.

**Pilbhit**, a town in India, in the district of Bareilly, in the Northwest Provinces, 30 mi. n.e. of Bareilly city, on the Desha River, the entrepôt for an extensive traffic between the upper and lower country. The most important

## Pillory

industry is sugar refining. In 1740 it was seized by the Rohilla leader, Háfiz Rahmat Khán, who made it his capital. In the western outskirts stand his cathedral mosque and the remains of his palace. Pop. 29,721.

**Pillory**, a frame of wood erected on posts, with movable boards, and holes through which were put the heads and hands of a criminal for punishment. In this manner persons were formerly exposed to public view, and generally to public insult. It was a common punishment in this country during the early days.

**Pilot**, a person qualified to navigate a vessel within a particular district. Laws regulating pilotage have been enacted, this power being controlled by Congress. The pilot laws of the states are different, some being unjust and burdensome, especially as to sailing vessels; while others are fair and equitable. A sailing or steam vessel engaged in foreign trade must pay for a pilot even when one is not employed. The compulsory pilotage system is being abolished in many large foreign seaports, without detriment to the general safety of navigation.

**Pilot Fish**, a genus of Teleostean fishes included in the Scomberidæ or mackerel family, and sometimes included in the same genus (*Scomber*) as the mackerel itself. The pilot fish was formerly supposed to act as a pilot to the mariner, and is still supposed to act as such to sharks. It often follows in the wake of ships for long distances, associating with sharks and devouring the refuse thrown overboard. The average length is about 12 in. In general form it resembles the mackerel.

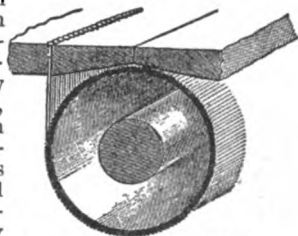
**Pillsbury**, JOHN S. (1828-1901), ex-Governor of Minnesota; b. at Sutton, N. H., July 29, 1828. When twenty-seven years of age he removed to Minnesota, and engaged in the hardware business at St. Anthony, now Minneapolis. He afterwards became interested in the lumber trade, and later with his brother, Charles A., founded the largest flour producing establishment in the world. He was governor of Minnesota from 1876 to 1882, and a member of the Board of Regents of the state university for forty years. He gave Science Hall, costing \$150,000, to the University of Minnesota.

**Pilsen**, a town in Western Bohemia, at the confluence of the Mies and Radbusa, 53 mi. s. w. of Prague. It consists of the town proper, with promenades on the site of the old ramparts, and of three suburbs. The principal buildings are the church (1292), townhouse, real school, and theaters. The chief article of manufacture and commerce is beer. Coal, iron, alum, etc., are worked in the neighborhood. The second town of Bohemia, Pilsen, dates from 1272. During the Thirty Years' War it was for a time the headquarters of Walenstein. Pop. 46,817.

**Pin**, a piece of wire, generally brass, sharp at one end and with a head at the other, chiefly used by women in adjusting their dress. By the old methods of manufacture by hand, the distinct processes, from the straightening of the wire to the spinning and hammering of the head, were usually said to be fourteen. Among the most important

## Pin

improvements in the fabrication of pins are the machines by which the head is formed from the pin itself, and the machine for sticking the pins in paper—both American inventions. Solid-headed pins, now universally used, were first made in 1824. The consumption of pins in the United States is estimated at thirty millions a day.



Pin-pointing Machine.

**Pin Making.**—Pins are made of an alloy of copper and zinc, two parts of the first to one part of the second. The metal is first cast in ingots in an iron mold about six feet long, three inches wide, and half an inch thick. These bars are rolled into sheets about one eighth of an inch thick. The pressure of the rolls makes the metal inflexible and somewhat brittle, and the bars are annealed or softened by heat and slow cooling several times while being reduced from ingots to sheets. When the sheets have reached the required thinness, they are passed through slitting rolls which slice up the sheets into rods one eighth of an inch square and these rods are drawn into wire. One end of the rod is pointed so that it will pass through a round hole in the steel draw plate. A pair of powerful nippers grasps the pointed end of the rod, and as the nippers are on a revolving reel, the rod is drawn through the hole and comes out on the other side a round wire, smaller in diameter than the square rod was. The reel of wire is annealed, and then drawn through another and smaller hole, and this process is continued, the wire being annealed each time until the size required for the pin is reached. The metal, though somewhat stiff, is too soft to spring out straight, and as the drawing reels are of a smaller diameter, the wire is kinky and must be straightened before it is ready for the pin-making machine. After the kinks have been taken out, the wire is wound on a large reel which is hung over the pin-making machine. In this machine the pin is cut from the wire, headed, pointed, sharpened, and polished. This machine is a combination of steel fingers, rollers, cams, toggle joints, headers, revolving files, and belts. The wire caught by a pair of rollers, is drawn forward into the machine, where it is cut into just the right length; two raps from a cam and toggle form the head. A steel finger puts the headed wire on a wheel under the heading dies, and the pointless pin is carried down between two revolving steel disks. One of them revolves faster than the other, so the pin is turned round as it travels forward. Just at this point it comes in contact with four revolving files which point the pin, and then an emery belt puts the first polish on it. The pins drop from the machine at the rate of 160 a minute and fall into a hopper, from which they are taken to the tinning room. In passing from the pin machine the

## Pinckney

pins become covered with oil and dirt, and this is removed by putting them into a revolving iron barrel with sawdust. The tinning process consists in the pins being boiled for four hours in a preparation of pure tin. They are then washed with strong soapsuds to give them a smooth surface. After being rolled through the sawdust again they are ready to be stuck into papers.

The sticking machine crimps the paper and sticks the pins in at the same time. The pins are put in a hopper which feeds the sticking machine. An inclined steel plate, furrowed with little runs or channels, leads from the hopper to the machine. The pins are caught by revolving steel fingers and pushed forward upon the inclined plate into the runs. The runs converge to a plate which moves slightly back and forth across the rows of slots. This cutting off plate catches the pins, and when the holes are full a number of little rams or hammers shove the pins into the crimp of the paper which is formed a second before the pins are stuck in. Black or mourning pins are made from iron wire and japanned.

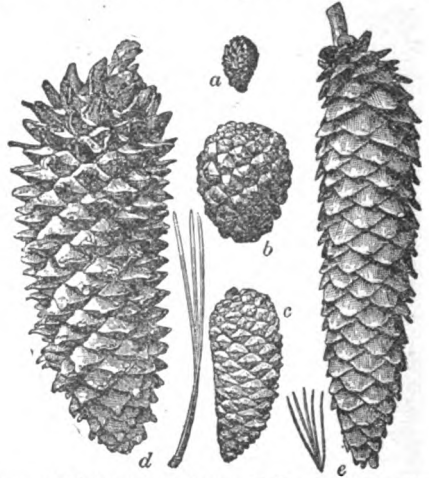
**PINCKNEY**, CHARLES COTESWORTH (1746-1825), statesman, was b. in Charleston, S. C. In the Revolutionary War he displayed resolution and intrepidity, and for two years suffered rigorous confinement. In 1787 was member of the convention that framed the Constitution. As minister to France in 1796 he had occasion to make the declaration, "Millions for defense, but not one cent for tribute." "His love of honor was greater than his love of power, and deeper than his love of self."

**PINDAR** (PIN'DAROS) (522-442), the greatest of the lyric poets of Greece, b. in Bœotia, in or near Thebes, of a noble family. At an early age he was instructed in music and poetry; and for the development of his poetical talent he was sent to Athens, where he became the pupil of Lasus of Hermione, the founder of the Athenian school of dithyrambic poetry. In after life he showed himself a great admirer of Athens and the Athenians, who rewarded him for the honors he paid to them by making him a public guest of the city and giving him a present of 10,000 drachmas, and after his death erected a statue in his honor. He was held in great honor by many princes of Greek states, for whom he composed choral songs, and had close relations with Delphi. He practised all kinds of lyric poetry, and excelled equally in all.

**Pine**, the popular name of trees of the genus *Pinus*, which is divided into two sub-orders, namely, 1, the fir tribe; and 2, the cypress tribe. The pines belong to the former section, and are distinguished from the spruce, larch, fir, cedar, etc., chiefly by having persistent leaves in clusters of two to five in the axils of membranous scales. All the European species, except one, have only two leaves in a sheath; most of the Asiatic, Mexican, and Californian kinds have three, four, or five leaves, and those of the U. S. and Canada have generally three. The cones also afford an important ready means of distinction and classification. The

## Pine

Scotch pine or fir is a tall, straight, hardy tree, from 60 to 100 ft. high; a native of most parts of Europe, flowering in May and June, and having many varieties. The leaves are rigid, in pairs, somewhat waved and twisted; the lower branches are somewhat pendant; the bark is of a reddish tinge, sometimes rough and furrowed. The leaves are distinguishable from those of all other pines in which they



Cones of (a) *Pinus montana*; (b) *P. pinea*; and (c) *P. pinaster*. Cones and needles of (d) *P. coulteri*; and (e) *P. lambertiana*. All about  $\frac{1}{4}$  natural size.

occur in pairs by their glaucous hue, especially when young. The Scotch pine almost always occurs in masses; it is considered full grown and fit to be cut down for timber in fifty or sixty years; but in the north of Scotland, where pine forests grew to perfection in former times, the tree continued to increase in bulk for three or four centuries. The tree is most abundant in the north of Europe, between lat. 52° and 65°. There are extensive forests of it in Russia, Poland, Sweden, Norway, Germany, the Alps, the Pyrenees, and the Vosges. The Corsican pine grows to a height of from 80 to 100 ft., and in the island of Corsica it is said to reach an altitude of 140 to 150 ft. The pinaster, or cluster pine, is indigenous to the south of Europe, to the west of Asia, the Himalayas, and it seems, even to China. It is a large, handsome, pyramidal tree, varying from 40 to 60 ft. in height. Its cones point upward, in star-like clusters, whence the name of pinaster or star pine. In France, especially between Bayonne and Bordeaux, it covers immense tracts of barren sand, in which it has been planted to prevent the sand from drifting. The stone pine is a lofty tree in the south of Europe, where it is a native; its spreading head forms a kind of parasol; the trunk is 50 or 60 ft. high, and clear of branches. In Britain the stone pine seldom exceeds the size of a large bush, although specimens have reached a height of 30 and 40 ft. Sabine's pine was discovered in California in 1826. The leaves are in threes, rarely in



## Pineapple

fours, from 11 to 14 in. long; the trees are of a tapering form, straight, and from 40 to 120 ft. high, with trunks from 3 to 12 ft. in diameter. The Cembran pine is a native of Switzerland and Siberia. The red Canadian pine, or yellow pine, inhabits the whole of Canada from the Atlantic to the Pacific, and is also found in the northern and eastern parts of the U. S. The trunk rises to the height of 70 or 80 ft. by about 2 in diameter at the base, and is chiefly remarkable for its uniform size for two thirds of its length. The wood is yellowish, compact, fine grained, resinous, and durable. The true yellow pine rises to the height of 50 or 60 ft., by 15 or 18 in. in diameter at base. The cones are small, oval, and armed with fine spines. The timber is largely used in ship-building and for house timber. The Labrador or Bank's pine is usually a low straggling tree, growing among barren rocks to a height of from 5 to 8 ft., but may attain three times that height. The cones are recurved and twisted; and the leaves are regularly distributed over the branches. In Nova Scotia and the state of Maine it is known as the scrub pine, and in Canada as the gray pine. The other American pines are the Jersey pine, the trunk of which is too small to be of any utility in the arts; the pitch pine, which is most abundant along the Atlantic coast, and the wood of which, when the tree grows in a dry, gravelly soil, is compact, heavy, and contains a large proportion of resin; the loblolly pine, the timber of which decays speedily on being exposed to the air; the long-leaved pine, which abounds in the lower part of the Carolinas, Georgia, and Florida, furnishing resin, tar, pitch, and turpentine, and timber which is hardly inferior to the white oak in naval architecture; the Weymouth pine, the timber of which, though not without essential defects, is consumed in much greater quantities, and for a far greater variety of purposes, than almost any other; and Lambert's pine, which grows between the fortieth and forty-third parallels of latitude, and about 100 mi. from the Pacific. It is of gigantic size, the trunk rising from 150 to upward of 200 ft., and being from 7 to nearly 20 ft. in diameter.

**Pineapple**, a tropical fruit which takes its name from its outward resemblance to a pine cone. The botanical name is *ananassa sativa*, and it belongs to the plant order *Bromeliaceæ*. The pineapple is a biennial. It has long pointed leaves, whose edges are in most species furnished with sharp spines. The leaves are thick and juicy. From the center of the cluster a stem rises two or three feet and bears on its upper end a flower cluster in the form of a conical spike. Each flower is placed in the axil of a bract, except those near the top, which develop into a cluster of small leaves which crowns the ripened fruit. The fruit is the thickened fleshy flower stalk, and in this respect, as well as in its odor and flavor, the pineapple somewhat resembles the strawberry. The pineapple is a native of South America and the West Indies, where the early Spanish explorers discovered it to be cultivated

## Pintail Duck

by the Indians. It is highly prized and has been carried to the warm countries of Europe and Asia. In England it is raised in hot houses. Its successful culture requires a warm climate and abundant moisture. The fruit varies in size from two to twelve pounds. About fifty species are known. The fibre of the leaves is often woven into delicate and beautiful fabrics. That of the Philippines is called *Pina muslin*.

**Pine Bluff**, Jefferson co., Ark., on Arkansas River. Railroads: St. Louis Southwestern; St. L. I. M. & S.; P. B. & S. L.; and L. R. & P. B. Industries: two iron foundries, meal mill, farm implements and several other factories. Surrounding country agricultural. The town was first settled in 1840, and became a city in 1878. Pop. 1900, 11,496.

**Pingree, HAZEN S.** (1840-1901), ex-Governor of Michigan; b. at Denmark, Maine, Aug. 30, 1840. He learned the trade of a shoe cutter, but entered the Union army in 1861 and served during the war. He subsequently located in Detroit, and in 1866, with C. H. Smith, started a small shoe factory. This has become one of the largest manufacturing establishments in the West. He was mayor of Detroit from 1889 to 1896, and governor of Michigan from 1896 to 1900. He died in London, Eng., June 18, 1901. Mr. Pingree was the leader in a number of municipal reforms in Detroit, and was a strong advocate of municipal ownership of street railways. While governor he attempted to reform the methods of taxation.



The Pineapple.

**Pinkerton, A. G.** (1819-1884), b. in Scotland. He came to Chicago in 1841, and was made deputy sheriff and a member of the detective department of Chicago police in 1850. He was head of the secret police of the Union army during the Civil War. Among the books which he has published are *Criminal Reminiscences and Detective Sketches*, *The Gypsies and the Detectives*, *The Burglar's Fate*, *The Spy of the Rebellion*, and *Thirty Years a Detective*. The organization of the Pinkerton detectives which he effected is still in existence.

**Pintail Duck**, a genus of ducks, so called from the elongated form of the tail-feathers. In size the common pintail duck is equal to

## Pinto

the mallard. They are common in the Mississippi Valley, and occur on the Mediterranean coasts, in the Gulf of Mexico, in the West Indian Islands, and in Africa. They breed in confinement, and the flesh is savory.

**Pinto**, MAJOR SERPA, Portuguese traveler, b. in 1846, and educated at the Royal Military College, Lisbon; entered the Portuguese army in 1863. In 1877-79 he crossed Africa from Benguela to Durban, and described his journey in a work entitled *How I Crossed Africa*, which procured him many honors, especially from geographical societies. He has led several exploring expeditions, and his proceedings in the Zambezi district led in 1890 to a vigorous and successful protest by Britain against the claims of Portugal in that quarter.

**Pinturicchio** (pin-tu-rik'yō), an eminent Italian painter of the Umbrian school, whose real name was Bernardino di Betto, was b. at Perugia. He lived for a time at Rome, and while there was engaged on the frescoes of the Sistine Chapel, being at this time under the influence of Perugino. His chief work was a series of mural paintings illustrating the life of Pope Pius II, in the cathedral library at Siena. There are also fine frescoes by him in the Bufalini Chapel in the church St. Maria in Araceli, Rome. He left many exquisite altarpieces and other works in tempera; he never painted in oil.

**Piombo**, SEBASTIANO LUCIANI DEL (1485-1547), a celebrated painter b. at Venice. He studied under Giovanni Bellini and Gorgione, whose fine coloring he imitated. Coming to Rome about 1512, he was induced by Michael Angelo to enter into rivalry with Raphael. When Raphael painted his celebrated *Transfiguration*, Sebastiano attempted to surpass it by painting the *Raising of Lazarus*, which is considered his greatest work, and is now in the National Gallery, London. His chief merit, however, lay in his single figures and portraits, such as his *Clement VII*.

**Piotrkov**, a town of Russian Poland in the government of same name, one of the oldest towns of Poland. It was at one time the seat of the Polish diet, and the kings were elected here. Pop. 24,866. The government has an area of 4,729 sq. mi. It is moderately fertile, and has considerable manufactures of cottons and woollens. Pop. 1,061,101.

**Pipe**, a wine measure usually containing very nearly 105 imperial or 126 wine gallons. Two pipes or 210 imperial gallons make a tun. In practice, however, the size of the pipe varies according to the kind of wine it contains. Thus a pipe of port contains (about) 138 wine gallons; of sherry 130; of Madeira 110; etc.

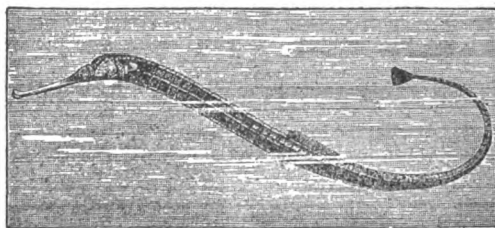
**Pipe**, a tube for the conveyance of water, steam, gas, or other fluid, used for a great variety of purposes in the arts and in domestic economy. The materials of which pipes are made are also very various, wood, stone, earthenware, iron, lead, copper, leather, gutta-percha, etc., all being employed. Drainage and sewage pipes of great strength and size (measuring from 1 or 2 up to 54 in. in diameter) are now usually made of fire clay, glazed

## Pipefishes

on their outer and inner surfaces. Large iron pipes are usually cast, and are used for the supply of water and gas.

**Pipe**, TOBACCO, a bowl and connecting tube, made of baked clay, wood, stone, or other material, and used in smoking tobacco. The chief processes in the manufacture of clay pipes are molding and baking. Finer and more expensive pipes are made of meerschäum, a somewhat plastic magnesian stone of a soft greasy feel. Meerschäum pipe making is carried on to the greatest extent by the Germans, and Vienna may be said to be the center of the manufacture. Sometimes the bowl alone (which is frequently artistically carved) is of meerschäum, the stem being of wood, the best sorts of which are got from the young stems of the Mahaleb cherry, grown near Vienna, the mock orange of Hungary, and the jessamine sticks of Turkey. The stem, whether of the same material as the bowl or of wood, is usually provided with a mouthpiece of ivory, silver, or amber, the last being preferred. Brier-root pipes, with the bowl and stem of one piece of wood, and provided with amber, ivory, or bone mouthpieces, are now very common. They are made of the roots of a large variety of heath. Many Germans prefer pipes with porcelain bowls, which are sometimes beautifully painted in the style of fine chinaware painting. The Eastern hookah is a pipe of great size, the bowl of which is set upon an air-tight vessel partially filled with water, and has a small tube which passes down into the water; the long flexible smoking-tube is inserted in the side of the vessel, and the smoke is made to pass through the water, being thus cooled and deprived of some noxious properties. In this country pipes have been in use from a very remote period. Indian pipes, with elaborately carved soapstone bowls and ornamented wooden stems, or entirely of baked clay, have been found in the ancient mounds of the West, together with other relics of an unknown race.

**Pipefishes** (*Syngnathus*), a genus of fishes included in the sub-order Lophobranchii and nearly allied to the curious little fishes popu-



Pipefish.

larly known as "sea-horses." See *Hippocampus*. They are distinguished by a long and tapering body, and by jaws united to form a tube or pipe, bearing the mouth at the tip. The *Syngnathus acus* is one of the most familiar species. It averages 20 in. in length. The largest of the pipefishes is said to attain a

## Pipit

length of 3 ft. A very remarkable circumstance in connection with the pipefishes consists in the males of some species possessing a pouch-like fold, situated at the base of the tail, in which the eggs are contained after being extruded from the body of the females, and in which the young, after hatching, continue to reside for a time. The name pipefish is also applied to the members of the genus *Fistularia*, included in the Acanthopteroous division of the Teleostei. The bones of the face are prolonged to form a tubular structure, at the extremity of which the mouth opens. The *Fistularia tapacaria* of the Antilles represents this genus.

**Pipit** (or Titlark), a genus of perching birds possessing striking affinities with the larks,



Meadow Pipit.

which they resemble in the large size of the hinder claw, but commonly classed with the wagtails, which they closely resemble in their habits of running swiftly on the ground. All the pipits build their nests on the ground. The song in all consists of a clear, simple note.

**Pippin**, the name given to a certain class of dessert apples, probably because the trees were raised from the pips or seeds, and bore the apples which gave them celebrity without grafting. The Ribston, Golden, and Newton Pippin are favorite varieties in the U. S.

**Piqua**, city of Miami co., O., 73 m. w. by n. of Columbus; on the Miami river and the Miami & Erie Canal; and on the Cinn., Ham. & Dayton, the Miami Valley and the Pitts., Cinn., Chi. & St. L. railroads. Piqua is a trade center and great shipping point in a rich farming region. It is the second linseed oil center in the United States. Other industries are strawboard mills, bent-wood works, rolling mills, tin-plate works, corrugated iron works and furniture factories. Pop. 1900, 12,172.

**Pi'racy** consists in committing those acts of robbery and depredation upon the high seas, or other places where the admiralty has jurisdiction, which, if committed upon land, would have amounted to felony only. This is substantially the definition of this offense by the law of nations, which, on conviction, is punished with death in the U. S. It is an offense against the universal law of society. Piracy, in the common sense of the word, is distinguished from privateering by the circumstance that the pirate sails without any commission, and under no national flag, and attacks the

## Pisciculture

subjects of all nations alike; the privateer acts under a commission from a belligerent power, which authorizes him to attack, plunder, and destroy the vessels which he may encounter belonging to the hostile state.

**Piræus**, the principal port of both ancient and modern Athens, is situated about 5 mi. from that city, on a peninsula. It has three harbors; two on the east side, anciently named Zea and Munychia, and one on the west side, called simply Piræus, or the Harbor, the largest of the three. The Piræus was anciently connected with Athens by walls known as the Long Walls. When Greece was liberated from Turkish rule the Piræus was merely a scene of ruins. Since then a flourishing industrial and trading town has grown up, which is connected with Athens by a railway. Pop. 34,327.

**Pisa**, a town of Northern Italy, capital of the province of the same name, 6 mi. from the Mediterranean, and 44 mi. w. of Florence, on both banks of the Arno, here crossed by three stone bridges for general traffic, and one carrying the railway. It is surrounded by walls and ditches, and defended by a citadel, the fortified circuit having a length of nearly 6 mi., much of the space enclosed being unoccupied. The river is lined by handsome quays on both sides; the streets are spacious and well paved; and the houses are remarkable for the profusion with which marble has been employed in their construction. In the northwest part of the city is a remarkable group of buildings consisting of the Duomo or cathedral, the Baptistery, the famous "Leaning Tower," and the Campo Santo. The manufactures consist chiefly of silk, woolen, and cotton goods. The population, which reached 150,000 when the city was in its zenith, is now only 37,704. The province of Pisa has an area of 1,180 sq. mi., and a pop. of 283,269.

**Pisa**, COUNCIL OF, a general council of the Roman Catholic Church held to consider the pretensions of the rival popes of Avignon and of Rome, opened March 25, 1409. The rival popes, Benedict XIII (of Avignon) and Gregory XII (of Rome) were summoned to appear within a stated period, but refused to comply. After mature deliberation both popes were formally deposed, and Cardinal Pietro Philargi, archbishop of Milan, was elected. The authority of the council was not, however, generally recognized, and it was not until 1417 that the schism can be said to have terminated.

**Pisces** (the Fishes), a sign of the zodiac, which is entered by the sun about February 19. The constellation which occupies the zodiacal region corresponding to the sign has the same name; it contains some interesting double stars.

**Pisciculture**, the breeding, rearing, preservation, feeding, and fattening of fish by artificial means. Pisciculture has been practised from very remote ages, having been in use in ancient Egypt, and followed in China in early times on a very large scale. The art, so far as the perfecting of natural conditions under



## Pisistratus

which fish live and thrive, without interfering directly with the ordinary processes of nature, has thus always been more or less practised. But the discovery that the ova of fish can be taken from the body of the female parent, impregnated with the male milt and hatched in tanks, has led to a great extension of the art. One great point in modern pisciculture is the propagation and rearing of young fish in artificial ponds with the view of introducing fish into some locality where they were not previously found. Salmon and trout ova have been sent from Britain, and successfully propagated in Australia and New Zealand. The art has now come into general favor and is widely followed, very many rivers having on their banks breeding and rearing establishments for the purpose of increasing the stock of fish in the streams. In Scotland a very successful effort has been carried out at Stormontfield, near Perth, on the Tay, and there is a still more famous piscicultural establishment belonging to Sir James Gibson Maitland at Howietoun, near Stirling. The Midlands Counties' fish culture establishment at Malvern Wells is the largest in England. From Huningue, near Basel, on the Rhine, millions of ova are annually despatched to England, Germany, Spain, and other countries. The American Fish and Fisheries Commission have successfully introduced into various waters the American whitefish, the Californian trout, the American brook char, etc., and pisciculture on a large scale is practised both in the U. S. and Canada. The artificial culture of oysters, mussels, lobsters, and other crustacea is also receiving attention, and altogether the art is every year attaining a greater development, and promises to become yet an important department of commercial industry.

**Pisistratus**, "tyrant" of Athens, was descended from Codrus, the last king of Athens, and was b. not later than 612 B. C. He was rich, handsome, and eloquent, and soon placed himself at the head of one of the three parties into which Attica was then divided. By putting himself forward as the patron and benefactor of the poor, and by advocating civil equality and a democratic constitution, he was able to seize upon the Acropolis in 560 B. C., and thus to make himself master, or, as the Greeks termed it, "tyrant" of the city. But though a tyrant in the Greek sense, his use of power was by no means tyrannical. He made no attempt to abolish the wise laws of Solon, but confirmed and extended their authority. He was, however, twice driven from Athens; but in the eleventh year of his second banishment succeeded in making himself master of the sovereignty for the third time. Pisistratus erected splendid public buildings at Athens, established a public library, and collected and arranged the poems of Homer, and conducted himself with so much prudence and clemency that his country scarcely ever enjoyed a longer term of peace and prosperity.

**Pistil**, in botany, the female or central seed-bearing organ of a phanerogamous flower, consisting of one or more *carpels* or modified leaves.

## Pitch

There may be only a single pistil or several in the same flower. It consists essentially of two parts, the *ovary*, containing the ovules or young seeds, and the *stigma*, a cellular secreting body, which is either seated immediately on the ovary (as in the tulip and poppy), and is then called *sessile*, or is borne on a stalk called a *style* interposed between the ovary and stigma. It is on the stigma that the pollen falls by which fecundation takes place, after which the ovule develops into the seed.

**Pistol**, a small firearm with a curved stock, discharged with one hand, named from the town of Pistoja, where they were first made. Pistols were introduced into England in 1521. Mention is made of their use in 1544. The "dag" mentioned by the Elizabethan writers was a kind of clumsy pistol. Pistols are made of various sizes, ranging from 6 in. (the saloon and pocket pistol) to 18 and even 24 in. (the holster pistol).

**Pitcairn Island**, an island in the South Pacific, belonging to the Low Archipelago; length, 2½ mi.; breadth, about 1 mi. It was discovered by Carteret in 1767. Its coast is almost perpendicular throughout its whole extent, fringed with formidable rocks and reefs, accessible only at two points, and not at all in stormy weather. It rises to the height of 1,100 ft., and the soil, naturally fertile, yields good pasture, potatoes, yams, plantain, and breadfruit, pineapples, and other tropical fruits. The island is chiefly remarkable as the home of the descendants of the *Bounty* mutineers, nine of whom, together with six men and twelve women, natives of Tahiti, landed here in 1790. Violent dissensions soon arose, and at the end of ten years the only survivors were John Adams, an Englishman, the females, and nineteen children. They were found in 1808 by the American, Captain Folger, who reported the discovery to the British government. They were transferred to Norfolk Island in 1856, but about 40 soon returned. In 1881, the inhabitants numbered 96, and in 1884, 130.

**Pitch**, the residuum obtained by boiling tar till the volatile matter is driven off. See *Tar Making*.

**Pitch Stone**, a black, glossy, pitch-like volcanic rock, found in southern Europe and South America. See *Obsidian*.

**Pitt, WILLIAM** (1759-1806), the second son of William Pitt, earl of Chatham, and of Lady Hester Grenville, daughter of Hester, Countess Temple, was b. on May 28, 1759. He was educated at Cambridge. He was called to the bar in 1780, and entered Parliament the following year as member for Appleby. He became chancellor of the exchequer at twenty-three, under the Earl of Shelbourne, and in the following year attained the position of prime minister. Later he was returned by the University of Cambridge. His first measure was the passing of his India bill, establishing the board of control, which was followed by much of that fiscal and financial regulation that gave so much *éclat* to the early period of his administration. The establishment of the delusive scheme of a sinking fund followed in 1786, and his Regency

bill in 1788. The French Revolution now broke out, and in 1793 war arose between Great Britain and France, a conflict which brought a heavy responsibility on Pitt, and immense sacrifices and burdens on his country. In 1800 the Irish union was accomplished. In 1801 the opposition of the king to all further concession to the Irish Catholics caused Pitt to resign his post. The Peace of Amiens succeeded; and the Addington administration, which concluded it, Pitt supported for a time, and then joined the Opposition. The new minister, who had renewed the war, unable to maintain his ground, resigned; and in 1804 Pitt resumed his post at the treasury. Returning to power as a war minister, he exerted all the energy of his character to render the contest successful, and found means to engage the two great military powers of Russia and Austria in a new coalition, which was dissolved by the battle of Austerlitz. This event he did not survive long. Biographers naturally differ as to his merits as a statesman; some assign him a most exalted place, while others represent him as entirely destitute of great ideas, as a man of expedients instead of principles, as a lover of place and royal favor.

**Pit'tacus** (652-569 B.C.), one of the so-called seven wise men of Greece. He was highly celebrated as a warrior, a statesman, a philosopher, and a poet. In 589 the citizens raised him to the dictatorship, an office which he filled for ten years.

**Pittsburg**, county seat of Allegheny co., Pa., 354 m. w. by n. of Philadelphia; on the delta between the Allegheny and Monongahela rivers, which here form the Ohio; and on eight main and several branch lines of railway. The principal railroads centering here are the Pennsylvania System, the Baltimore & Ohio and the Vanderbilt System. Navigation on the three rivers has been greatly facilitated by the construction of dams, chiefly movable. Nine bridges span the Allegheny and five the Monongahela, while several new ones are being projected. From its situation, Pittsburg enjoys excellent commercial facilities and is the center of an extensive commerce with the western states. Its nearness to the apparently inexhaustible iron, coal, petroleum and natural gas fields of Pennsylvania has made it a great manufacturing center. The extent of its iron manufactures has given it the name of the *Iron City*. It manufactures more than half of the Bessemer steel, rolled iron and steel rails and plates and sheets made in the United States, and is the leading plate-glass center of the world. Other important productions are aluminum, copper, refined petroleum, malt liquors, steam and electrical machinery, tobacco, leather, and cotton and woolen goods. Pittsburg was laid out in 1765 on the site of the old French Fort Duquesne. When the British captured the fort, they changed its name to Fort Pitt, in honor of William Pitt. It became a city under the name of Pittsburg, in 1816. Pittsburg is substantially and compactly built. The principal streets, Liberty, Wood, Market, Smith-

field, Fifth Av., Pennsylvania and Sixth streets contain many handsome buildings. Among the public buildings are the Municipal Hall, United States Arsenal, Mercantile Library, Carnegie Institute, Duquesne Club, and Trinity Church. The Pittsburg Female College (Methodist Episcopal) and the Pennsylvania Female College (Presbyterian) are both flourishing institutions of learning. Among charitable institutions are the Western Pennsylvania Hospital, the Mercy Hospital, the Homeopathic Hospital, the Episcopal Church Home and the Roman Catholic Orphan Asylum. The Convent of the Sisters of Mercy is the oldest house of this order in America. Pittsburg is the second city of Pennsylvania in population and importance. Pop. 1900, 321,161.

**Pittsfield**, Berkshire co., Mass., on Housatonic River, 150 mi. w. of Boston. Railroads: Housatonic, and Boston & Albany. Industries include the manufacture of shoes, machinery, knit goods, cotton and woolen goods, etc. Pop. 1900, 21,766.

**Pittsburg**, Crawford co., Kans. Railroads: A. T. & S. F.; Missouri Pacific; St. L. & St. F.; K. C. F. S. & M. Industries: coal mining, zinc smelting (employing 1,200 men), brick works, etc. Pop. 1900, 10,112.

**Pittston**, Luzerne co., Pa., on Susquehanna River, 9 mi. n.e. of Wilkesbarre. Railroads: D. L. & W.; Lehigh Valley; Delaware & Hudson. Industries: mainly mining of anthracite coal. There are also planing, paper, and knitting mills, engine and terra-cotta works, and tanneries. Pop. 1900, 12,556.

**Pius II**, AENEAS SYLVIUS PICCOLOMINI (1405-1464), was Pope from 1458 to 1464. He studied at Siena and subsequently became secretary to Cardinal Capronica. He was also secretary to Antipope Felix. Emperor Frederic III made him ambassador successively to the courts of Milan, Naples and Rome. Calixtus III raised him to the cardinalate. As Pope he founded a military order of knights to defend the isles of the Aegean Sea against the Turks. But Pius II was best known for his literary works. The most interesting of his writings are his letters.

**Pius V** (1504-1572), Pope from 1566 to 1572. His chief service as Pope was to enforce the reform decrees of the Council of Trent. With Spain and France he organized the Holy League against the Turks.

**Pius VI** (1717-1799) (GIOVANNI ANGELO BRASCHI), pope. He held important offices under several pontiffs, was raised to the cardinalate by Clement XIV, and succeeded him in 1775. Several beneficent reforms were introduced by him in the finance department.

**Pius VII** (1741-1823) (GREGORIO BARNABA CHIARAMONTI), pope. Pius VI created him bishop of Tivoli, cardinal and bishop of Imola; and his friendly attitude toward the Cisalpine republic secured him the favor of France, and the election to the papal chair in 1800. After his accession he aimed at re-establishing the old order of things, and to gain it he tried to conciliate Napoleon by attending his coronation. He aroused the open enmity of the em-

## Pius IX

peror by refusing to be present at the coronation in Milan; and to recognize his brother Joseph as king of Naples; the results being another occupation of Rome by French troops, the incorporation of the papal cities, and shortly after of Rome itself, with the kingdom of Italy, and the arrest of the pope and his confinement in Savona and afterward at Fontainebleau. In 1814 he was released and restored to the possession of all the papal territories except those of Avignon and Venaissin in France and a narrow strip of land beyond the Po.

**Pius IX** (1792-1878) (GIOVANNI MARIA MASTAI-FERETTI), pope. He held various ecclesiastical offices under Leo XII, who appointed him archbishop of Spoleto in 1827, and to the see of Imola in 1832. Although raised to the cardinalate in 1840 he resided in his diocese until his election to the pontificate in 1846. His accession was signalized by the release of 2,000 political prisoners, followed by a complete amnesty; and Italy was to be free and independent under a liberal constitution. A Roman republic was proclaimed (1849), with Mazzini at its head. Louis Napoleon, president of the French Republic, sent an expedition to Rome, which defeated the Italian patriots under Garibaldi, and occupied the city (July 3). The pope returned in April, 1850, but he left the direction of state affairs principally in the hands of his secretary of state, Cardinal Antonelli.

**Pius X**, GIUSEPPE (1835— ), pope; the successor of Leo XIII. Sarto was born at Riese, Italy, in the Venetian province of Treviso, on June 2, 1835. He was sent from the village school to the college at Castel Franco, whence he passed to the central seminary at Padua, where he graduated with much distinction and was ordained priest in the cathedral of Castel Franco on Sept. 18, 1858. His first curé was in the parish of Tombolo, from which in 1867 he was transferred to Salzano and was made parish priest. Eight years later, the Bishop of Treviso recognizing his piety and ability, appointed him not only canon of the cathedral of Treviso and chancellor of the diocese, but the spiritual director of the college. Ere long he was made dean of the chapter, and after serving during an interregnum as vicar-general was appointed suffragan by the new bishop. He next became Bishop of Mantua. In 1893, Leo XIII made him a cardinal and almost immediately afterward created him Patriarch of Venice. In 1894, there was considerable anti-clerical agitation going on in Venice. But the new bishop was not long in making himself beloved by all in his Patriarchate. He took a deep interest in social questions and threw himself heart and soul into all enterprises for the bettering of the lot of the poor, lending his aid to the institution of rural banks, co-operative societies and benevolent associations. On August 4, 1903, he was elected pope and chose for himself the papal name of Pius X. He was crowned in St. Peter's Cathedral at Rome, Aug. 9. The new pope is known for his sin-

## Plague

cerity, his generosity and his sympathy with the people. In breadth of education he is one of the most respected members of the Sacred College. He lives simply, almost frugally, and his manner is characterized by a charming and genuine courtesy. Among the few books from his pen is a *Manual of Politeness*, which he wrote for the benefit of his clergy. He is an eloquent and convincing speaker, a skilled musician, and a connoisseur in art. As a worker he belongs to the strenuous type and is known among the clergy as a rigid disciplinarian. Although not a politician, according to the ordinary meaning of that word, he has good common sense and has on various occasions proved that he possesses executive ability in a marked degree. Yet the basis of the character of Pius X is a simple and earnest piety.

**Pizar'ro**, FRANCISCO (1471-1541), Spanish adventurer, the discoverer and conqueror of Peru, the illegitimate son of a hidalgo, and was first a swineherd and then a soldier. The spirit of adventure which at that time pervaded Spain, prompted him to seek fortune in the newly found continent of America, where he participated in various military and trading expeditions. While resident near Panama he became associated with two other adventurers, Hernando Luege, or de Luegues, and Diego de Almagro. In 1524, they jointly fitted out an expedition with a view to exploration and conquest, and on their second voyage discovered Peru; but finding their force inadequate for conquering the country, Pizarro returned to Spain for assistance. He arrived in Seville in 1528, was granted the necessary powers and a small force, and re-crossed the Atlantic in 1531. The following year he arrived in Peru during a civil war, treacherously seized the person of the reigning inca at a friendly banquet, and after extorting an immense ransom, put him to death. The whole empire was gradually conquered without much opposition, but its settlement was long in abeyance owing to a feud between Pizarro and Almagro. Hernando Pizarro, a brother of the general, strangled Almagro in 1537. This act was avenged when a son of Almagro murdered Francisco Pizarro in his palace at Lima. Lima was founded by Pizarro in 1535, and his remains are interred in the cathedral of that city, also founded by him.

**Pizarro**, GONZALO (1502-1548), half brother of the preceding. His brother appointed him governor of Quito in 1540, and after the assassination of Francisco, he raised an army against the new viceroy, Blasco Nuñez, and the latter was defeated and slain near Quito in 1546. But Pizarro did not long enjoy his success, being beaten, taken prisoner, and beheaded.

**Plague**, a contagious and very fatal febrile disease characterized by entire prostration of strength, stupor, delirium, often nausea and vomiting, and certain local symptoms, as buboes, carbuncles, and livid spots. Like all other malignant fevers the plague has its various stages, but most frequently runs its course



## Plainfield

in three days, although death may ensue a few hours after its appearance. If the patient survive the fifth day, he will, under judicious treatment, generally recover. It is now almost universally admitted that the plague is a specific disease, and that it is the result of a miasmatic poison. It is also well established that unfavorable climatic influences, such as heat and humidity combined, faulty sanitary conditions, inadequate air, light, water, and food, favor its spread when once introduced. There is no specific remedy against the disease, and a variety of treatment has been adopted on different occasions by different medical men. The plague appeared in the most ancient times, although historians have used the term indiscriminately for other epidemics. The first recorded visitation of the plague to Europe is that at Athens (430 B.C.), described by Thucydides; Josephus relates that of Jerusalem A.D. 72. Among the most disastrous plagues of antiquity are those of Rome in 262, when 5,000 persons are said to have died daily; and of Constantinople in 544. From the latter part of the sixth to the twelfth century it ravaged at intervals various parts of Europe, particularly France and Germany. In the thirteenth century it was brought to modern Europe by the Crusaders, and from 1347 to 1350 it traversed all Europe, and was then called the *black death*. The scourge again claimed its victims in the succeeding centuries, and in 1593 it was brought to England by an army returning from the Continent. London lost by the plague 36,269 lives in 1603; 35,500 in 1625; 13,480 in 1636; and 68,600 in 1665. The plague in Marseilles in 1720 caused the death of over 60,000 in seven months. In 1771 it nearly swept off the whole population of Moscow. Its last appearance in Europe was in 1878-79, on the banks of the Lower Volga.

**Plainfield**, Union co., N. J., 21 mi. s.w. of New York. Railroad, New Jersey Central. It is the center of an agricultural district. Pop. 1900, 15,369.

**Plaintiff**, in law courts, the person who commences a suit against another in law or equity.

**Plan**, in architecture, a drawing showing the design of a building, a term chiefly used in reference to horizontal sections showing the disposition of the walls and various floors of the building, and of the doors and windows, etc.; but also applied to elevations and vertical sections. A *geometrical plan* is one wherein the several parts are represented in their true proportions. A *perspective plan* is one, the lines of which follow the rules of perspective, thus reducing the sizes of the more distant parts. The term is also applied to the draught or representation on paper of any projected work, as the *plan* of a city or of a harbor.

**Plane**, a joiner's tool, consisting of a smooth-soled solid block, through which passes obliquely a piece of edged steel forming a kind of chisel, used in paring or smoothing boards or wood of any kind. Planes are of various kinds, as the *jack plane*, used for taking off the roughest and most prominent parts of the

## Planet

wood; the *trying plane*, which is used after the jack-plane; the *smoothing plane* (7½ in. long); and *block plane* (12 in. long), chiefly used for cleaning off finished work, and giving the utmost degree of smoothness to the surface of the wood; the *compass plane*, which has its under surface convex, its use being to form a concave cylindrical surface. There is also a species of plane called *rebate plane*, being chiefly used for making rebates. The *plow* is a plane for sinking a channel or groove in a surface, not close to the edge of it. *Molding planes* are for forming moldings, and must vary according to the design. Planes are also used for smoothing metal, and are wrought by machinery.

**Plane Tree**, a genus of trees, nat. order Plantanaceæ. The American plane-tree or button-wood abounds in American forests, and on the banks of the Ohio attains sometimes a diameter of from 10 to 14 ft., rising 60 or 70 ft. without a branch. The bark is pale green and smooth, and its epidermis detaches in portions; the fresh roots are a beautiful red; the leaves are alternate, palmated, or lobed; and



Oriental Plane; a.—branch; b.—flower, and c.—fruit, on larger scale than a.

the flowers are united in little globular, pendent balls. The wood in seasoning takes a dull red color, is finegrained, and susceptible of a good polish, but speedily decays on exposure to the weather. The Oriental plane resembles the preceding, and is plentiful in the forests of Western Asia.

**Planet**, a celestial body which revolves about the sun as its center, or a body revolving about another planet as its center. The best known *major* planets are, in order of their proximity to the sun, Mercury, Venus, the Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Mercury, Venus, Mars, Jupiter, and Saturn were known to the ancients. Uranus was accidentally discovered by Herschel in 1781, while the discovery of Neptune was the result of pure intellectual work, the calculating of Leverrier and Adams (1845). The planetoids or asteroids are small bodies discovered since the beginning of the present century between the orbits of Mars and Jupiter. The number of these asteroids is annually increased by fresh discoveries; nearly 200

## Planing Machine

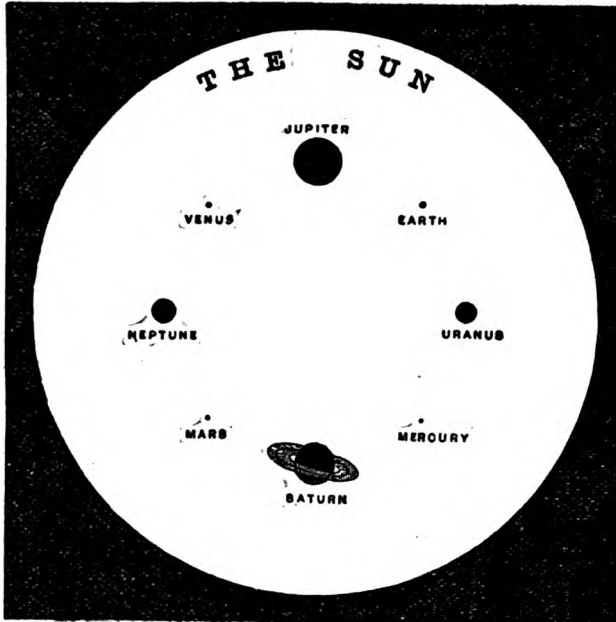


Diagram Showing Comparative Sizes of Sun and Planets.

are now known. Mercury, Venus, the Earth, and Mars closely resemble each other in many respects. They are all of moderate size, with great densities; the earth weighing as much as five and a half times an equal bulk of water. They shine only by reflected sunlight. Jupiter, Saturn, Uranus, and Neptune, on the other hand, are of enormous size, of small densities, some of them weighing less than an equal bulk of water, and probably exist at a high temperature, and give out in addition to reflected sunlight a considerable amount of light and heat of their own. The most colossal of the planets is Jupiter; its volume exceeds that of the earth about 1,200 times. Saturn is next in size. Mars, Jupiter, Saturn, Uranus, and Neptune, being outside the earth's orbit, are sometimes called the *superior planets*; Venus and Mercury, being within the earth's orbit, are called *inferior planets*. The family of major planets has also been subdivided into *intra-asteroidal* planets—Mercury, Venus, the Earth, Mars; and *extra-asteroidal* planets—Jupiter, Saturn, Uranus, and Neptune, the character of the two being very different as above described. The planet which approaches nearest to the earth is Venus, the least distance in round numbers being 23,000,000 mi; the most distant is Neptune, least distance 2,629,000,000 mi.

**Planing Machine**, a machine tool for planing wood or metal. For the former purpose the usual form has cutters on a drum rotating on a horizontal axis over the board which is made to travel underneath. The cutter drum may be repeated underneath, and at the edges, so as to plane all sides simultaneously. In planing metals the object to be planed, fixed

## Plantain

on a traversing table, is moved against a relatively fixed cutter, which has a narrow point and removes only a fine strip at each cut.

**Plantagenet**, a surname first adopted by Geoffrey, count of Anjou, and said to have originated from his wearing a branch of broom (*plante de genêt*) in his cap. This name was borne by the fourteen kings, from Henry II to Richard III, who occupied the English throne from 1155–1485. In 1400 the family was divided into the branches of Lancaster (Red Rose), and York (White Rose), and from their reunion in 1485 sprang the House of Tudor.

**Plantain** (or Great Plantain), a common weed, the leaves of which are all radical, oval, and petiolate, and from among them arise several long cylindrical spikes of greenish inconspicuous flowers. The root and seed are still occasionally employed in the treatment of diarrhea, dysentery, and external sores; the seeds are also collected for the food of birds.

**Plantain** (Plantain tree), a native of the East Indies, is cultivated in mostly all tropical countries. The stem is soft, herbaceous, 15 to 20 ft. high, with leaves often more than 6 ft. long and nearly two broad. The fruit

grows in clusters, is about 1 in. in diameter and 8 or 9 inches long. The stem dies down after fruiting; but the root stock is perennial, and sends up numerous fresh shoots annually. It is easily propagated by suckers. The banana (which see) is a closely-allied variety or species. Their fruits are among the most useful in the vegetable kingdom, and form the entire sustenance of many of the inhabitants of tropical climates. A dwarf variety, *M. chinensis*, produces a fruit in European hothouses. The fibers of the leaf stalks of *M. textilis* of the Philippine Islands supplies Manilla hemp or abada, from which cordage of the strongest character is made,



Greater Plantain.

## Plastering

the finer fibers being used in the making of cloth.

**Plastering** is the art of covering the surface of masonry or woodwork with a plastic material in order to give it a smooth and uniform surface, and generally in interiors to fit it for painting or decoration. In plastering the interior of a house a first coat is generally laid on of lime, thoroughly slacked, so as to be free from any tendency to contract moisture, and mixed with sand and cow's hair. For the purpose of receiving this coat the wall is generally first covered with laths or thin strips of wood, with narrow interstices between. The face of the first coat, which should be of considerable thickness, is troweled, or indented with cross lines by the trowel, to form a key for the finishing coats. The second coat is applied to this when it is thoroughly dried. It is rubbed in with a flat board so as thoroughly to fill the indentations and cover the unequal surface of the first coat with a smooth and even one. In plastering walls great care must be taken to have the surface perfectly vertical. The setting coat, which is of pure lime, or for moldings or finer work, of plaster of Paris or stucco, is applied to the second coat before it is quite dry. A thin coating of plaster of Paris is frequently applied to ceilings after the setting coat.

**Plaster of Paris**, the name given to gypsum when ground and used for taking casts, etc. If one part of powdered gypsum be mixed with two and a half parts of water a thin pulp is formed, which after a time sets to a hard compact mass. By adding a small quantity of lime to the moistened gypsum a very hard marble-like substance is obtained on setting.

**Plata**, RIO DE LA (or River Plate), runs for more than 200 mi. between the Argentine Republic and Uruguay, and is not strictly speaking, a river, but rather an estuary, formed by the junction of the great rivers Paraná and Uruguay. It flows into the Atlantic between Cape St. Antonio and Cape St. Mary, and has here a width of 170 mi. On its banks are the cities and ports of Montevideo and Buenos Ayres. Navigation is hampered in some parts of the river by shallow water and sand-banks. It was discovered in 1515 by Juan Diaz de Solis, and called Rio de Solis; it owes its present name to the famous navigator Cabot.

**Plating**, the coating of a metallic article with a thin film of some other metal, especially gold or silver. As regards plating with precious metals, electro-deposition has entirely superseded the old Sheffield method, which consisted in welding plates of various metals at high temperatures. This welding process is now, however, largely employed in plating iron with nickel for cooking vessels, iron with brass for stair rods and other furnishing and domestic requisites, and lead with tin for pipes, etc.

**Platinum**, one of the metals first made known to Europe in 1741. *Native Platinum* occurs mostly in small irregular grains, generally contains a little iron, and is accompanied besides by iridium, osmium, rhodium, palladium, ruthenium (hence called the "platinum

## Platinum

metals"), and also sometimes by copper, chromium, and titanium. It was first obtained in Peru, and has since been found in various other localities, such as Canada, Oregon, the West Indies, Brazil, Colombia, Borneo, etc., but the chief supply of platinum ore comes from the Ural Mountains in Siberia. It was there discovered in beds of auriferous sands in 1823, and has been worked by the Russian government since 1828. Pure platinum is almost as white as silver, takes a brilliant polish, and is highly ductile and malleable. It is the heaviest of the ordinary metals, and the least expansive when heated; specific gravity 21.53 rolled, 21.15 cast. It undergoes no change from the combined agency of air and moisture, and it may be exposed to the strongest heat of a smith's forge without suffering either oxidation or fusion. Platinum is not attacked by any of the pure acids. Its only solvents are chlorine and nitro-muriatic acid, which act upon it with greater difficulty than on gold. In a finely divided state it has the power of absorbing and condensing large quantities of gases. On account of its great infusibility, and its power generally of withstanding the action of chemical reagents, platinum is much used as a material for making vessels to be used in the chemical laboratory. Crucibles, evaporating dishes, etc., are very often made of platinum; so also the large stills used for the evaporation of sulphuric acid. The useful alloys of platinum are not numerous. With silver it forms a tolerably fusible white alloy, malleable and brilliant when polished; but it scales and blackens by working. Gold, by a forge heat, combines with platinum, and the alloys, in all proportions, are more fusible than the latter metal. In the proportion of 38 grs. to 1 oz. it forms a yellowish white, ductile, hard alloy, which is so elastic after hammering that it has been used for watch springs; but the favorable results expected from them have not been realized. Alloyed with iridium (a rare metal of the same group) it possesses an excellent and unalterable surface for fine engraving, as in the scales of astronomical instruments, etc. This alloy has also been adopted for the construction of international standards of length and weight. Mercury, by trituration with spongy platinum, forms an amalgam at first soft, but which soon becomes firm, and has been much used in obtaining malleable platinum. A coating of platinum can be given to copper and other metals by applying to them an amalgam of spongy platinum and 5 parts of mercury; the latter metal is then volatilized by heat. Lead combines with platinum readily; and iron and copper in like manner. The last mentioned, when added in the proportion of 7 to 16 of platinum and 1 of zinc, and fused in a crucible under charcoal powder, forms the alloy called artificial gold. Steel unites with platinum in all proportions, and, especially in the proportion of from 1 to 3 per cent. of platinum, forms a tough and tenacious alloy, well adapted for cutting instruments. Arsenic unites easily with platinum, and is sometimes employed for



## Plato

rendering the latter metal fusible. An alloy of platinum, iridium, and rhodium is used for making crucibles, etc. It is harder than pure platinum, is less easily attacked by chemical reagents, and bears a higher temperature without fusing.

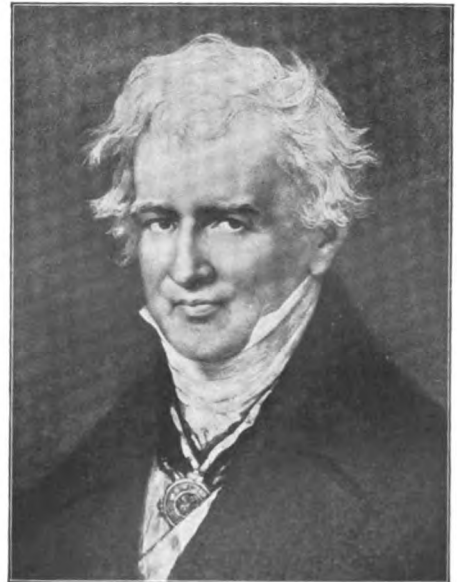
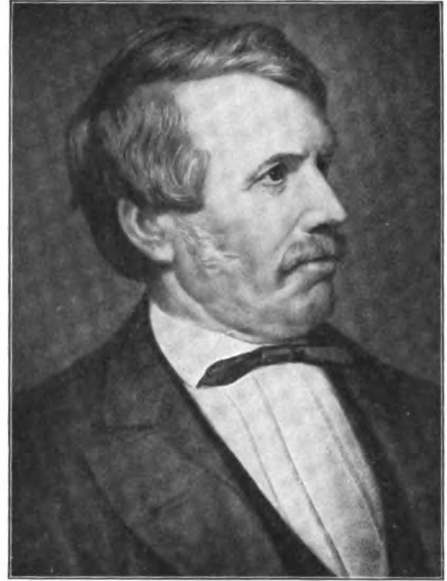
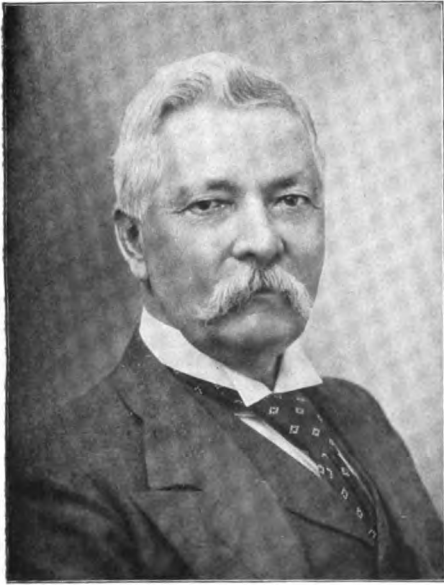
**Plato** (429-347 B. C.), an ancient Greek philosopher, founder of one of the great schools of Greek philosophy, was b. at Athens. Few particulars of his life are known, but it is beyond doubt that he was well connected and carefully educated. About his twentieth year he came directly under the influence of Socrates, and from this time he gave himself entirely to philosophy. Until the death of Socrates he appears to have been his constant and favorite pupil; but after that event Plato is supposed to have left Athens with a view to improving his mind by travel. He is said to have visited Cyrene (in North Africa), Lower Italy, and Sicily. Various other journeys are attributed to him, but without sufficient authority. About B. C. 389 or 388 Plato returned to Athens and began to teach his philosophical system in a gymnasium known as the Academy, his subsequent life being unbroken, except by two visits to Sicily. He appears to have had a patrimony sufficient for his wants, and taught without remuneration. One of his pupils was Aristotle.

The reputed works of Plato consist of *Dialogues* and *Letters*, the latter now regarded as spurious; but the genuineness of most of the *Dialogues* is generally admitted. The chronology of the *Dialogues* is a matter of uncertainty. The first attempt at a critical arrangement was made by Schleiermacher, who adopted an arrangement into three divisions, according to the leading doctrines he believed they were intended to inculcate. The chief works in the first section are *Phædrus*, *Protagoras*, *Parmenides*, *Lysis*, *Laches*, *Charmides*, *Euthyphron*; in the second, *Theætetus*, *Sophistes*, *Politicus*, *Phædo*, *Philebus*, *Gorgias*, *Meno*, *Euthydemus*, *Cratylus*, *Symposium*; in the third, the *Republic*, *Timæus*, *Critias*, and the *Leges* (or *Laws*). Hermann has attempted to make out a chronological arrangement, and other scholars who differ from Schleiermacher have attempted various theories of constructive arrangement. These schemes in general proceed on the assumption that each dialogue, being an artistic whole, forms a link in a chain. Grote and others, however, do not admit that Plato followed any plan either artistic or didactic. Apart from their philosophical teaching the dialogues of Plato are admirable as works of literature, especially for their dramatic truthfulness, and exhibit Greek prose in its highest perfection. In all of them Socrates (idealized) appears as one of the speakers. They contain also lively and accurate accounts of previous systems of Greek philosophy and their teachers, introduced not merely for historical purposes, but incidentally to the analysis of their opinions. There is an excellent English translation of the whole by Jowett.

The philosophy of Plato must be regarded as one of the grandest efforts ever made by the

## Plato

human mind to compass the problem of life. After the example of Socrates he held the great end of philosophic teaching to be to lead the mind of the inquirer to the discovery of truth rather than to impart it dogmatically, and for this end he held oral teaching to be superior to writing. This preference appears to have determined the conversational form given to most of his works. Plato originated the distinction of philosophy into the three branches of ethics, physics, and dialectics, although these names were first applied by his disciple Xenocrates. The cardinal principle of Plato's dialectical system is the doctrine of ideas. True science, according to him, was conversant, not about those material forms and imperfect intelligences which we meet with in our daily intercourse with men; but it investigated the nature of those purer and more perfect patterns which were the models after which all created beings were formed. These perfect types he supposed to have existed from all eternity, and he calls them the *ideas* of the great original Intelligence. As these cannot be perceived by the human senses, whatever knowledge we derive from that source is unsatisfactory and uncertain. Plato, therefore, maintains that degree of skepticism which denies all permanent authority to the evidence of sense. Having discovered or created the realm of ideas he surveyed it throughout. He defined its most excellent forms as beauty, justice, and virtue, and having done so he determined what was the supreme and dominant principle of the whole. It is the idea of the Good. The harmony of intelligence throughout its entire extent with goodness, this is the highest attainment of Plato's philosophy. His ethical system was in direct dependence upon his dialectics. He believed that the ideas of all existing things were originally contained in God. These ideas were each the perfection of its kind, and as such were viewed by God with approval and love. God himself being infinitely good was the object of all imitation to intelligent beings, hence the ethics of Plato had a double foundation, the imitation of God and the realization of ideas, which were in each particular the models of perfection. To his cosmical theories he attributed only probability, holding that the dialectical method by which alone truth could be discovered was applicable only to ideas and the discovery of moral principles. The most valuable part of Plato's cosmogony is its first principle, that God, who is without envy, planned all things that they should be as nearly as possible like himself. Plato's political treatises are the application of his ethical principles to social organization. His genius was more adapted to build imaginary republics than to organize real ones; hence his judgment of statesmen is also faulty and often unjust, as, for instance, in the case of Pericles and Themistocles. He was guided by one grand principle, which is mentioned in several of his writings, that the object of the education and instruction of young people, as well as of the government of nations, is to make them better, and whoever loses sight of this object, what-



# EXPLORERS

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## Platonic Love

ever merit he may otherwise possess, is not really worthy of the esteem and approbation of the public.

**Platonic Love**, a term by which is generally understood a pure spiritual affection between the sexes unmixed with carnal desires, and regarding the mind only and its excellences.

**Platt**, THOMAS C., b. in New York in 1833. He was educated at Yale College and later became president of Tioga National Bank. He was a member of Congress from 1872 to 1876, and was chosen U. S. senator in 1881. He resigned this position on account of a disagreement with President Garfield as to federal patronage, and failed of re-election. In 1880 he became president of the U. S. Express Company, and in 1897 was elected U. S. senator from New York.

**Plattdeutsch** (plät'doich) (or Low German), is the language of the North German Lowlands, from the borders of Holland to those of Russian Poland. The Dutch and Flemish languages also belong to the Low German dialects, but being associated with an independent political system, and having a literature of their own, are reckoned as distinct languages. The Low German dialects agree in their consonantal system not only with Dutch and Flemish, but also with English and the Scandinavian tongues. See *Philology*. Until the Reformation Low German was the general written language of the part of the Continent above mentioned; but from that time Low German works became gradually fewer, owing to the position now taken by the High (or modern classical) German. Even as a spoken language High German has ever since been slowly superseding the Low. In recent times, however, Low German literature has received a new impetus from Klaus Groth and Fritz Reuter. Linguistically the Low German dialects have received a good deal of attention, and many valuable lexicographical works have appeared.

**Platte** (plat), a river which rises in the Rocky Mountains by two branches, called respectively the North and South Forks of the Platte. The united stream falls into the Missouri after a course of about 1,600 mi. It is from 1 mi. to 3 mi. broad, shallow, encumbered with islands, has a rapid current, and therefore not navigable.

**Plattsburgh**, Clinton co., N. Y., on Lake Champlain. Railroad: Del. & Hudson Canal Co., and Chateaugay. Industries: type-writing machines, two flouring mills, iron foundry, shirt and sewing machine factories. Surrounding country agricultural and mineral. The town was first settled in 1784 and became a city in 1815. Pop. 1900, 8,434.

**Plattsmouth**, Cass co., Neb., on Missouri River, at mouth of the Platte, 21 mi. s. of Omaha. Railroads: B. & M. R., and Missouri Pacific. Industries: large railroad shops, machine shops, flour mills, canning factories, etc. Grain, lumber, and cattle are shipped. Pop. 1900, 4,964.

**Plauen**, a thriving manufacturing town in

## Plelades

Saxony, circle of Zwickau, in a beautiful valley on the left bank of the Elster, 60 mi. s. of Leipzig, 78 mi. w.s.w. of Dresden. It is walled and has a castle. Manufactures machinery, paper, leather, calicoes, and extensively all kinds of embroidered goods. Pop. 47,077.

**Plautus**, TITUS MACCIUS (254-184 B. C.), one of the oldest and best Roman comic writers, and one of the founders of Roman literature, b. at Sarsina, in Umbria. We have few particulars of his life. He is said to have been first connected with a dramatic company at Rome; then to have engaged in business, but losing his means was at one time in a very destitute condition, and compelled to earn his livelihood by turning a baker's hand-mill, in which position he became a successful writer of comedies. The purity of his language, his genuine humor, and his faithful portrayal of middle and lower class Roman life, made him a great favorite with the Roman public, and his plays successfully held the stage for some centuries. He was much admired by Cicero and Varro. For his characters, plots, scenes, etc., he was chiefly indebted to the poets of the new Attic comedy, but the language was his own. Some twenty of his plays have been preserved to us.

**Plebeians** (ple-bē'anz) (or Plebs), in ancient Rome, one of the great orders of the Roman people, at first excluded from nearly all the rights of citizenship. The whole government of the state, with the enjoyment of all its offices, belonged exclusively to the patricians, with whom the plebeians could not even intermarry. The civil history of Rome is to a great extent composed of the struggles of the plebeians to assert their claim to the place in the commonwealth to which their numbers and social importance entitled them, and which were crowned with complete success when (B.C. 286) the *Lex Hortensia* gave the *plebiscita*, or enactments passed at the plebeian assemblies, the force of law. From this time the privileges of the two classes may be said to have been equal.

**Plehve**, WJATSCHESLAW KONSTANTINOVITSCH (1848-1904), Russian Minister of the Interior. He is the son of a poor nobleman, but was patronized by a wealthy aristocrat, and when of age became, successively, imperial counsel at Warsaw, procurator at St. Petersburg, chief of state police, Assistant Minister of Interior and in 1902 Minister of Interior. He has a reputation for great severity toward the dependent peoples of Russia. Plehve was assassinated at St. Petersburg, July 28, 1904.

**Plelades** (pli'a-dēz), the so-called "seven stars" in the neck of the constellation Taurus, of which only six are visible to the naked eye of most persons. They are regarded by Mädler as the central group of the Milky Way. Ancient Greek legends derive their name from the seven daughters of Atlas and the nymph Pleione, fabled to have been placed as stars in the sky, and the loss of the seventh was variously accounted for. In reality the cluster consists of far more than seven stars.

## Pleonasm

**Ple'onasm**, in rhetoric, is a figure of speech by which we use more words than seem absolutely necessary to convey our meaning, in order to express a thought with more grace or greater energy; it is sometimes also applied to a needless superabundance of words.

**Pliny** (CAIUS PLINIUS SECUNDUS), Roman writer, commonly called *Pliny the Elder*, was b. A. D. 23, probably at Comum (Como). He went to Rome at an early age, and having means at his disposal availed himself of the best teachers. He served with distinction in the field, and after having been made one of the augurs of Rome, he was appointed governor of Spain. Every leisure moment that he could command was devoted to literature and science, and his industry was so great that he collected an enormous mass of notes, which he utilized in writing his works. He adopted his nephew, Pliny the Younger, A. D. 73, and perished in the eruption of Mount Vesuvius which overwhelmed Pompeii and Herculaneum in 79. The only work of Pliny which is now extant is his *Natural History*, a work containing a mass of information on physics, astronomy, etc., as well as natural history proper.

**Pliny** (CAIUS PLINIUS CAECILIUS SECUNDUS), the Younger, a nephew of the former, was b. A. D. 61 at Comum (Como). Having lost his father at an early age, he was adopted by his uncle, and inherited the latter's estates and MSS., and also his industry and love of literature. He filled several public offices, and was consul in A. D. 100. In A. D. 103 he was appointed proprator or governor of Pontica, which office he administered for almost two years to the general satisfaction. He was one of the most distinguished and best men of his age. The time of his death is unknown, but it is supposed that he died about the year 115. As an author he labored with ardor, and attempted both prose and poetry. Of his writings only a collection of letters in ten books, and a panegyric on Trajan, remain.

**Ploti' nus** (205-270), the systematic founder of Neo-Platonism, b. at Lycopolis, in Egypt. In his twenty-eighth year the desire to study philosophy awoke in him, but he got no satisfaction from his teachers till a friend led him to Ammonius Saccas. He spent eleven years near this excellent master, and the knowledge he had acquired created an ardent desire in him to know also the teachings of the Persian and Indian philosophers. For this purpose he joined the expedition of the Emperor Gordian to the East in 242, but after the latter's death he reached Antioch with difficulty and returned to Rome, where he subsequently lived and taught. At first he taught orally, but after ten years he was prevailed upon to commit his doctrines to writing, and he composed twenty-one books, which were only put into the hands of the initiated. About 262-264 Porphyry became his pupil, and during his six years' stay in Rome, twenty-four books were written by Plotinus, and nine more after Porphyry had left for Sicily. On account of the weakness of his sight Plotinus

left the correction of his works to Porphyry, who also was his literary executor, and has arranged his works in six Enneads, which form the bible of the New Platonists. His teaching secured him great respect and popularity among the Romans. He was held to be so wise and virtuous that parents left their children to his care. He enjoyed the favor of the emperor Gallienus, and he even succeeded in inspiring the fair sex with a desire to study philosophy. The writings of Plotinus are often obscure and even incomprehensible, but on the whole they exhibit a fertile and elevated mind and close reasoning. His system depends less upon the intrinsic truth it contains than upon its historical value, which is great both in its antecedents and consequents. Plotinus was well acquainted with the older Greek philosophy, with the Ionian and the Eleatic schools, with Plato and Aristotle and other founders of systems, and according to the eclectic tendencies of his day he believed there was a fundamental unity in these various systems. It was to Plato, however, that Plotinus looked as his great authority. He believed himself a strict follower of Plato, and his own system a legitimate development of the principles of that great philosopher.

**Plover**, the common name of several species of grallatorial birds belonging to the genus *Charadrius*. They inhabit all parts of the world. They are gregarious, and most of them are partial to the muddy borders of rivers and marshy situations, subsisting on worms

and various aquatic insects; but some of them affect dry sandy shores. Their general features are: bill long, slender, straight, compressed; nostrils basal and longitudinal; legs long and slender, with three toes before, 1.—Ringed plover; 2.—gray plover; 3.—golden plover.

connected to the middle one by a short web; wings middle-sized. Most of them molt twice a year, and the males and females are seldom very dissimilar in appearance. The various species pass so imperceptibly into one another that their classification is often attended with difficulty. All nestle on the ground. They run much on the soil, patting it with their feet to bring out the worms, etc. The golden plover, also called yellow and whistling plover, is the best known, and its flesh and its olive-green dark-spotted eggs are considered a delicacy by epicures.

**Plow**, an implement drawn by animal or steam power, by which the surface of the soil



is cut into longitudinal slices, and these successively raised up and turned over. The object of the operation is to expose a new surface to the action of the air, and to render the soil fit for receiving the seed or for other operations of agriculture. Plows drawn by horses or oxen are of two chief kinds: those without wheels, commonly called *swing plows*, and those with one or more wheels, called *wheel plows*. The essential parts of both kinds of plows are, the beam, by which it is drawn; the stilts or handles, by which the plowman guides it; the coulter, fixed into the beam, by which a longitudinal cut is made into the ground to separate the slice or portion to be turned over; the share, by which the bottom of the furrow-slice is cut and raised up; and finally, the mold-board, by which the furrow-slice is turned over. The wheel plow is merely the swing plow with a wheel or pair of wheels attached to the beam for keeping the share at a uniform distance beneath the surface. Besides these two kinds there are *subsoil plows*, *drill plows*, *draining plows*, etc. Every part of a plow of the modern type is made of iron. *Double mold-board plows* are common plows with a mold-board on each side, employed for making a large furrow in loose soil, for earthing up potatoes, etc. *Turn-wrest plows* are plows fitted either with two mold-boards, one on each side, which can be brought into operation alternately, or with a mold-board capable of being shifted from one side to the other, so that, beginning at one side of a field, the whole surface may be turned over from that side, the furrow being always laid in the same direction. One of these plows with two mold-boards is so constructed as to be dragged by either end alternately, the horses and plowmen changing their position at the end of every furrow. Such plows are useful in plowing hillsides, as the furrows can all be turned toward the hill, thus counteracting the tendency of the soil to work downward. In the most improved style of wheel plow there are a larger and a smaller wheel, the former to run in the furrow, the latter on the land. These have also a second or skim coulter, for use in lea plowing, to turn over more effectually the grassy surface. What is called a *gang plow* is essentially a number of plows combined, four, six, or eight shares being fixed in one wheeled frame, and dragged by a sufficient number of horses, such plows being used on very large farms. *Steam plows* on various principles have latterly been introduced into the U. S. Some are driven by one engine remaining stationary on the headland, which winds an endless rope (generally of wire) passing round pulleys attached to an apparatus called the "anchor," fixed at the opposite headland, and round a drum connected with the engine itself. Others are driven by two engines, one at either headland, thus superseding the "anchor." As steam-plowing apparatus are usually beyond both the means and requirements of single farmers, companies have been formed for hiring them out. In steam plowing it is common to use plows in which two sets of plow bodies and coulters are at-

tached to an iron frame moving on a fulcrum, one set at either extremity, and pointing different ways. By this arrangement the plow can be used without turning, the one part of the frame being raised out of the ground when moving in one direction, and the other when moving in the opposite. It is the front part of the frame, or that farthest from the driver, which is elevated, the plowing apparatus connected with the after part being inserted and doing the work. Generally two, three, or four sets of plow bodies and coulters are attached to either extremity, so that two, three, or four furrows are made at once.

**Plum**, a genus of plants belonging to the nat. order Rosaceæ, sub-order Amygdalææ. About a dozen species are known, all inhabiting the north temperate regions of the globe. They are small trees or shrubs, with alternate leaves and white flowers, either solitary or disposed in fascicles in the axils of the leaves. The common garden plum, introduced from Asia Minor, is the most extensively cultivated, and its fruit is one of the most familiar of the stone fruits. The varieties are very numerous, differing in size, form, color, and taste. Some are mostly eaten fresh, some are dried and sold as prunes, others again are preserved in sugar, alcohol, syrup, or vinegar. They make also excellent jams, jellies, and the syrup from stewed plums forms a refreshing drink for invalids, and a mild aperient for children. Perhaps the most esteemed of all varieties is the green gage. A very popular and easily grown sort is the *P. damascena* or damson. The wood of the plum tree is hard, compact, traversed with reddish veins, susceptible of a fine polish, and is frequently employed by turners and cabinetmakers. The sloe or black-thorn is a species of wild plum bearing a small, round, blue-black, and extremely sour fruit. Its juice is made into prune wine, which is chiefly employed by distillers, wine and spirit merchants, etc.; for coloring, purifying and mellowing spirits. See colored plate, Fruits—Apple.

**Plummet** (plumb line), a leaden or other weight let down at the end of a cord to regulate any work in a line perpendicular to the horizon, or to sound the depth of anything. Masons, carpenters, etc., use a plumb line fastened on a narrow board or plate of brass or iron to judge whether walls or other objects be perfectly perpendicular, or *plumb* as the artificers call it. Near a range of high mountains the plumb line, as can be shown by special arrangements, is not perfectly true, but inclines toward the mountains; and officers in charge of the U. S. Coast and Geodetic Survey among the Hawaiian Islands have recently observed that the deviation of a plumb line from the vertical is greater in the case of mountains in an island than in continental mountains, and greater in the neighborhood of extinct volcanoes than in that of active volcanoes. In given localities the plumb line also varies according to the ebb and flow of the tide.

**Plumptre**, EDWARD HAYES (1821–1891), Dean of Wells. He graduated B. A. at Oxford 1844, M. A. 1847, when he was appointed chaplain



## Plush

at King's College, London, and professor of pastoral theology in 1853. He became successively prebendary of St. Paul's, London (1863), rector of Pluckley, Kent (1869), vicar of Bickley, Kent (1873), principal of Queen's College, London (1875), and dean of Wells (1881). As an able theologian and preacher he was chosen a member of the Old and New Testament revision companies in England, select preacher at Oxford (several times), Boyle lecturer (1866-67), Grinfield lecturer (1872-74). He has written a number of valuable works on theology, many of his sermons and lectures have been published, and the reviews and religious periodicals contain numerous contributions by him. We have besides from his pen several translations, including *Sophocles* (1866), *Æschylus* (1870), *Dante* (1887). His latest important literary work is a *Life of Thomas Ken, Bishop of Bath and Wells* (1888). The degree of D. D. was conferred by Glasgow University in 1875.

**Plush**, a fabric similar to velvet, from which it differs only in the length and density of the nap. The nap may be formed either in the warp or woof, the one in which it is being double, there being a warp and a woof for the body of the cloth, and a warp or woof for the nap. Plushes are now made almost exclusively of silk. The cheaper qualities have a cotton backing. Some of the finest dress plushes are produced in London, plushes for gentlemen's hats come chiefly from Lyons, while common or imitation plushes are largely manufactured in Germany. Plush is now also extensively used in upholstery and decorative work.

**Plutarch** (plō'tārk), a learned Greek writer, b. at Cheronæa in Bœotia, where he also died. Neither the year of his birth nor that of his death is accurately known, but it is generally held that he lived from the reign of Nero to that of Adrian (54-117 A.D.). He appears from his writings to have visited Italy, lectured there on philosophy, and stayed some time at Rome, where he established a school during the reign of Domitian. His *Parallel Lives of Illustrrious Greeks and Romans* is the work to which he owes his fame. The lives are nearly all written in pairs, one Greek and one Roman, followed by a comparison of the two, and are models of biographical portraiture. We have numerous editions and translations of them. Plutarch's other works, about sixty in number, are generally classed as *moralia*, though some of them are narrative. His writings show that he was well acquainted with the literature of his time, and with history, and that he must have had access to many books.

**Pluto**, in classical mythology, the god of the infernal regions, the ruler of the dead. He was a son of Chronus and Rhea, a brother of Zeus (Jupiter) and Poseidon (Neptune), and to him, on the partition of the world, fell the shades. He married Persephōnē. By the Greeks he was generally called Hades and by the Romans Orcus, Tartarus, and Dis Pater. As is the case with all other pagan deities, the accounts of Pluto vary with different writers and periods, and in later ages he was confounded with Plutus. The worship of Pluto

## Pneumatic Dispatch

was extensively spread among the Greeks and Romans. The cypress, the box, the narcissus, and the plant adiantum (maiden-hair), were sacred to him; oxen and goats were sacrificed to him in the shades of night, and his priests were crowned with cypress. He is represented in gloomy majesty, his forehead shaded by his hair, and with a thick beard. In his hand he holds a two-forked scepter, a staff, or a key; by his side is Cerberus. He is often accompanied by his wife.

**Plutonic Rocks**, unstratified crystalline rocks, such as granites, greenstones, and others, of igneous origin, formed at great depths from the surface of the earth. They are distinguished from those called volcanic rocks, although they are both igneous; plutonic rocks having been elaborated in the deep recesses of the earth, while the volcanic are solidified at or near the surface.

**Plutus**, in Greek mythology, the god of riches. Zeus struck him blind because he confined his gifts to the good; and thenceforth conferred them equally on the good and the bad. His residence was under the earth. Plutus is the subject of Aristophanes's comedy of the same name.

**Plymouth** (plim'uth), a seaport, municipal, and parliamentary borough of England, in Devonshire, at the head of Plymouth Sound, between the estuaries of the Plim and Tamar. It is well defended both land and seaward by a series of forts of exceptional strength provided with heavy ordnance. Charitable and educational institutions abound. The manufactures are not very extensive, and chiefly connected with ships' stores; but the fisheries are valuable, and Plymouth has a large export and coasting trade. Its chief importance lies in its position as a naval station.

**Plymouth**, Plymouth co., Mass., on Massachusetts Bay, 37 mi. s.e. of Boston. Railroad, N. Y. N. H. & H. Industries: cordage, iron foundry, two woolen mills, two cotton mills, rolling mills, bedstead, zinc, tack and nail, and other factories. Surrounding country agricultural. The town was first settled in 1620 by the Pilgrim Fathers. Pop. 1900, 9,592.

**Plymouth**, Luzerne co., Pa., on Susquehanna River, 4 mi. w. of Wilkesbarre. Railroad, D. L. & W. It is an important coal mining town, having twelve large breakers in operation. Pop. 1900, 13,649.

**Pneumatic Dispatch**, propulsion by means of compressed air or by forming a vacuum. Pneumatic railways have thus far proved abortive, but propulsion by compressed air has of recent years been successfully applied to a variety of practical uses. Parcels are thus conveyed, and internal communication in warehouses, hotels, etc., is carried on by its means. The most developed application of compressed air as a motive force is in connection with the telegraph service of large cities. Pneumatic dispatch has proved a most useful auxiliary in securing prompt and cheap collection and distribution of telegraphic messages. The vehicles charged with the messages, technically called *carriers*, are forced through leaden tubes con-

## Pneumatics

necting the various stations, and from  $1\frac{1}{2}$  to 3 in. diameter, by means of air pressure at one end, or sucked through by a partial vacuum at the other. The invention of Latimer Clark and Varley required a separate tube between each pair of stations, and admitted of only a single dispatch at a time; but a system of laying tubes in circuit for the continuous transmission of dispatches, by means of an uninterrupted air current in one direction, was adopted in Berlin by Messrs. Siemens and Halske in 1863. The tubes run in all directions. In the central districts, where the transmission is heavy, the stations are connected by a double tube, a receiving and a despatching one, forming a complete circuit, with a column of air always passing through it, and which is moved either by pressure, or by vacuum, or both. The up and down lines may be opened through their entire length, or blocked by switch boxes at an intermediate station. The terminal stations can send carriers to be stopped by the switch box at an intermediate station; and the intermediate station, when it knows a through carrier to be coming for one of the termini, can, if it happen to have any messages to send to that terminus, switch out the through carrier and insert its own messages without appreciable delay. The carriers in the 3 in. tubes hold about 50 messages. It is estimated that work may be performed by one of these tubes which would require six wires and twelve clerks. The circuit system, but not with a continuous current, is extensively used in Paris. The tubes are of iron, 2 ft. in diameter. Trains leave the central station at fixed intervals and make the circuit. Other European cities have similar systems. American cities work the English system, but brass instead of lead tubes are employed.

**Pneumatics**, that branch of physics which treats of the mechanical properties of elastic fluids, and particularly of atmospheric air. The chemical properties of elastic fluids (air and gases) belong to chemistry. Pneumatics treats of the weight, pressure, equilibrium, elasticity, density, condensation, rarefaction, resistance, motion, etc., of air; it treats also of air considered as the medium of sound (acoustics), and as the vehicle of heat, moisture, etc. It also comprehends the description of those machines which depend chiefly for their action on the pressure and elasticity of air, as the various kinds of pumps, artificial fountains, etc. The weight of the air, and its pressure on all the bodies on the earth's surface, were quite unknown to the ancients, and only first perceived in the middle of the seventeenth century by Galileo, when a sucking pump refused to draw water above a certain height; and to Torricelli, his pupil, belongs the honor of giving first a natural explanation of the phenomenon.

**Pneumatic Tires.**—The rubber used for pneumatic tires comes to the factory in large lumps known as "hams." First these lumps of crude rubber are cleaned and made into sheets. They are then taken to the drying room, where they are subjected to a tempera-

## Pneumatic Tires

ture of  $90^{\circ}$  for about 24 hours. This causes a shrinkage of about 15 per cent. The gum used for the inner tubes is left more nearly pure than that used for any other purpose. The gum and other ingredients are passed between a pair of smooth, hollow, iron rollers running at different rates of speed. The friction thus caused generates heat, so that it is necessary to keep the rollers cool by means of a stream of water circulating through them. When the compound has been thoroughly warmed up by this friction it comes from the rollers in a smooth, semi-transparent sheet of delicate, chocolate tint. The sheet is then carried to the calenders, where it is drawn down to one thirty-second of an inch in thickness. At the same time it is cut to the width required for making a tire. It is then rolled up on a wooden core with a sheet of muslin between the layers of rubber. Next the rubber goes to the tuberoom. Here two men unroll the rubber strips upon a table and cut them into proper lengths for a tube. The strips are then passed over to the next table, where they are rolled into shape after both surfaces have been covered with soapstone. At the next table a nozzle is attached to the end of the tube, and soapstone is blown through it to prevent adhesion of the inner surface. The tubes are then inspected, cut into the exact lengths, and the ends are closed up by inserting the forefinger, upon which is wrapped a piece of cloth dipped in benzine, and next sticking the ends into an ordinary clothes wringer. In the curing room the tubes go into a heater where they are subjected to a pressure of forty pounds for about four hours. The stems through which the tires are to be inflated are set on with a rubber solution. Then the tires are subjected to a final inspection by being inflated with compressed air and immersed in a tank of water. If any bubbles rise in the water the tire is faulty. The valves are then put into the stems and tied. This finishes the tube.

The casing stock from which the outer part of the tire is made is mixed by a different process from that used for the tubestock. After this the process of milling and calendering and cutting to the required width is identical with that just described for the tube stock. The "friction cloth," which forms the inner part of the outer tube, is made of strong duck which is tested by being subjected to a breaking strain of 200 pounds, and is then passed through a calender, which presses rubber, mixed by still another secret process, upon both sides and into the meshes of the cloth at an enormous pressure. This friction cloth is cut into diagonal strips just half the length necessary for a tire.

In the building room two strips of friction cloth are laid on a bench with a little groove down the center. A steel mandrel the size of the tire is lifted on the bench and rolled down the groove, the friction cloth being taken up and rolled around the mandrel as it rolls. The mandrels are warm and are painted with a solution of soapstone to prevent the rubber from sticking. A strip of casting stock is then

laid down over the groove on the bench, and the mandrel covered with the friction cloth is rolled back the other way, the builder gathering up the casing and pressing it upon the friction cloth until it adheres smoothly upon the outer surface. From the builders the mandrels go to the press room where they are put in large iron molds and subjected to heavy pressure and heat. The mandrels are taken out and thrown upon a bench, where a slit about six inches long is cut on the inner side, and the mandrel is put in a vise. The slit is then slipped over one of the ends of the mandrel which is readily pulled out. The casings then go to the trimmers. One man smooths off the outer edge with a pair of shears, and the other trims off the inner edge. The perfect casings then go to the perforator, who punches a hole for the valve and a dozen holes for sewing the slit. The next process is to draw the tubes through the casing. A strip of canvas is pasted to the end of the tube that lies under the slit to protect it from the needle. The tires are then inflated, taken to the storage room, and made ready for shipment.

**Po**, the largest river of Italy. It rises on the confines of France and Piedmont in Mount Viso, one of the Cottian Alps, and receives during its long course to the Adriatic (about 450 mi.) a vast number of tributary streams. It divides the great plain of Lombardy into two nearly equal parts, and is the grand receptacle for the streams flowing south from the Alps, and for the lesser waters that flow north from a part of the Apennine range. Its principal affluents are, on the left, the Baltea, Sesia, Ticino, Adda, and Mincio; on the right, the Tanaro, Trebbia, and Panaro. The Po, in spite of embankments, etc., is the cause of frequent inundations, especially near its mouth. In some places, owing to the silt carried down, its channel is now raised above the country through which it flows. Fish are plentiful in it, including the shad, salmon, and even sturgeon.

**Pocahontas** (1595-1617), daughter of Powhatan, a celebrated American Indian warrior of Virginia. Some romantic incidents are told of her life, but there seem to be considerable doubts as to their truth. She is said to have shown a great friendship for the English who colonized Virginia, and to have rendered them substantial services. In 1607 she prevailed on her father to spare the life of Captain John Smith, his prisoner, and two years later frustrated a plot to destroy him and his party. After Captain Smith had left the colony she was kept as a hostage by an English expeditionary force (1612). During this detention she married Mr. Rolfe, an Englishman, who in 1616 took her on a visit to England, where she was baptized and assumed the name of Rebecca. She left one son, who was educated in London, and whose descendants are said to exist still in Virginia.

**Pochard**, a subfamily of Anatidæ or ducks, inhabiting the Arctic regions. They migrate southward in winter to the coasts of North America and Europe; and they even occur in

Asia and in the Southern hemisphere. They are marine in habits, and feed upon crustaceans, worms, mollusks, and aquatic plants. There are numerous species, and the flesh of several is much prized as food. A typical form and one of the best known is the common pochard, variously called dunbird, red-headed poker, red-headed widgeon or duck. The head and neck are bright chestnut; eyes red; bill long; a broad, transverse, and dark-blue band on the upper mandible; length 16 to 17 in.; weight 1 to 2 lbs. Other familiar varieties are the long-tailed duck, the scaup pochard, the tufted pochard, and the canvas-backed duck of North America, so highly esteemed by epicures.

**Podiebrad** (pod'ye-brád), GEORGE (1420-1471), king of Bohemia. In 1444 he became one of the two governors of Bohemia during the minority of Ladislav, Albert's posthumous son, now king of the country, and, after overcoming the Catholic opposition, sole regent in 1451. Ladislav died in 1457, and Podiebrad was elected to the throne in the following year, and crowned by the Catholic bishops in 1459. He inaugurated his reign by the introduction of various beneficent laws, wise administration, and a policy of conciliation toward the Catholics.

**Podolia**, a government of Southwestern Russia; area 16,224 sq. mi. The country is mostly flat but a low branch of the Carpathians extends through it in an easterly direction. The principal rivers are the Dniester and the Bug. The climate is temperate and salubrious, the soil generally very fertile; in fact, Podolia forms one of the most valuable agricultural possessions of the Russian Empire. Manufactures are spreading rapidly, and beet sugar, spirits, flour, and tobacco are produced in great quantities. The trade with Germany, Austria, and Odessa is extensive. Capital Kamenetz. Pop. 2,350,000.

**Poe**, EDGAR ALLAN (1809-1849), poet, was b. at Boston. He was educated at the University of Virginia and became a private in the U. S. Army in 1827. Three years later he entered West Point, but was dismissed in disgrace in 1831. He then married Virginia Clemens and settled at Baltimore. In 1835 he moved to Richmond, three years later to Philadelphia, and in 1844 to New York. Poe was essentially a poet. His strange, half-romantic, half-sordid life, and his habitual melancholy and morbidness undoubtedly greatly influenced his writings. He is remembered principally for *The Raven*, an exceptionally beautiful poem. Pl. 23, Vol. III.

**Poe'rio**, CARLO (1803-1867), an Italian statesman, b. at Naples. The revolution of 1848 placed him at the head of the Neapolitan police, and of the ministry of public instruction, but, finding it impossible to get the Bourbons to fulfill their promises, he resigned. He sat in the new parliament and acted with the Opposition. In 1849 he was arrested and condemned without defense to twenty-four years' imprisonment. The barbarous treatment he received in prison gave occasion to Gladstone's



## Poetry

famous *Two Letters to Lord Aberdeen*, written in 1851 from Naples. In 1859 his sentence was commuted to transportation to South America; but he and his companions in misfortune effected a landing at Cork in Ireland, and thence proceeded to London. In 1861 he was elected vice president of the Italian Chamber of Deputies.

**Poetry**, that one of the fine arts which exhibits its special character and powers by means of language; or, according to Aytoun, the art which has for its object the creation of intellectual pleasures by means of imaginative and passionate language, and language generally, though not necessarily, formed into regular numbers. It has also been defined as the concrete and artistic expression of the human mind in emotional and rhythmical language. It is the earliest form of literature, and also the final and ideal form of all pure literature: its true place lying between music on the one hand, and prose or loosened speech on the other. The poet deals with language as the painter does with color, sometimes invading the domain of music and sometimes that of prose, or rather he brings prose into the domain of poetry. The two great classes of poetic impulse are dramatic imagination and lyric imagination. Partaking of the character of both is epic or narrative poetry. To the dramatic class belong tragedy and comedy; to the lyric belong the song, hymn, ode, anthem, elegy, sonnet, and ballad, though the last named frequently has a kind of epic character. Other forms, such as "didactic" poetry, "satirical" poetry, are also in use, but it is a question if they enter into the circle of poetry at all.

**Pointer Dog**, a breed of sporting dogs, nearly allied to the true hounds. The original breed is Spanish, but a cross with the fox-hound is now generally used. It is smooth, short-



Pointer Standing at Game.

haired, generally marked black and white like the foxhound, but occasionally a uniform black. It derives its name from its habit of stopping and pointing with the head in the direction of game, discovered with a very acute sense of smell. The dog once having pointed remains perfectly quiet. This faculty in the pointer is hereditary, but is better developed by training.

**Poison**, any agent capable of producing a morbid, noxious, dangerous, or deadly effect

## Poison

upon the animal economy, when introduced either by cutaneous absorption, respiration, or the digestive canal. Poisons are divided, with respect to the kingdom to which they belong, into animal, vegetable, and mineral; but those which proceed from animals are often called *venoms*, while those that are produced by disease have the name *virus*. With respect to their effects they have been divided into four classes, namely, irritant, narcotic, narcotico-acrid, and septic or putrescent. Many poisons operate chemically, corroding the organized fiber, and causing inflammation and mortification. To this class belong many metallic oxides and salts, as arsenic, one of the most deadly poisons; many preparations of copper, mercury, antimony, and other metals; the mineral and vegetable acids: the substance derived from some plants, as the spurge and mezereon; and cantharides, from the animal kingdom. Other poisons exercise a powerful action upon the nerves and a rapid destruction of their energy. These are the sedative or stupefying poisons, and belong for the most part to the vegetable kingdom. Opium, hemlock, henbane, belladonna, are the best known forms of this poison. Prussic acid, a poison obtained from the kernels of several fruits, the cherry laurel, etc., is one of the most rapid destroyers of life. Among plants there are many which unite the properties of both kinds, as the common foxglove, and the monkshood or aconite. An alkaloid is extracted from the latter,  $\frac{1}{10}$ th of a grain of which has proved fatal. Another class of poisons suddenly and entirely cause a cessation of some function necessary to life. To this class belong all the kinds of gas and air which are irrespirable, suffocating vapors, as carbonic acid gas, fumes of sulphur and charcoal, etc. Many preparations of lead, as acetate or sugar of lead, carbonate or white lead, etc., are to be counted in this class. The effects of poisons materially depend on the extent of the dose, some of the most deadly poisons being useful remedies in certain quantities and circumstances. Antidotes naturally vary with the different kinds of poisons. They sometimes protect the body against the operation of the poison, sometimes change this last in such a manner that it loses its injurious properties, and sometimes remove or remedy its violent results. Thus in cases of poisoning by acrid and corrosive substances we use the fatty, mucilaginous substances, as oil, milk, etc., which sheathe and protect the coats of the stomach and bowels against the operation of the poison. Against the metallic poisons substances are employed which form with the poison insoluble compounds, such as freshly prepared hydrated oxide of iron, or dialysed iron for arsenic; albumen (white of egg) for mercury; Epsom or Glauber's salts for lead. Lime, chalk, and magnesia are the best remedies for the powerful acids. For cantharides, mucilage, gruel, and barley water are employed. We oppose to the alkaline poisons the weaker vegetable acids, as vinegar. Prussic acid is neutralized by alkalis and freshly precipitated oxide of iron. To arouse those poisoned by opium, we use cof-

## Poitiers

fee and ammonia, and belladonna as an antagonistic drug. Chloral hydrate poisoning is similarly treated; and for strychnia or nuxvomica, anima' charcoal in water and chloral hydrate are used.

**Poitiers** (pwá-tyá) (or Poitiers), a town of France, on the Clain, formerly capital of the province of Poitou, at present of the department of the Vienne. The principal edifice is the cathedral. Poitiers is one of the most ancient towns of France, and the vestiges of a Roman palace, of Roman baths, of an aqueduct, and an amphitheater still remain. Two famous battles were fought in its vicinity, that in which Charles Martel defeated the Saracen army in 732, and that between the French under their king John II and the English under Edward the Black Prince in 1356. The manufactures are unimportant, but there is a large trade. Pop. 34,219.

**Pokeweed**, a North American branching herbaceous plant. Its root acts as a powerful emetic and cathartic, but its use is attended with narcotic effects. Its berries are said to possess the same quality; they are employed as a remedy for chronic and syphilitic rheumatism, and for allaying syphilitic pains. The leaves are extremely acrid, but the young shoots, which lose this quality by boiling in water, are eaten as asparagus.

**Polacca** (or Polacre), a three-masted vessel used in the Mediterranean. The masts are usually of one piece, so that they have neither tops, caps, nor cross trees. It carries a fore-and-aft sail on the mizzen mast, and square sails on the main mast and fore mast.

**Pol'and**, an extensive territory of Central Europe, which existed for many centuries as an independent and powerful state; but having fallen a prey to internal dissensions, was violently seized by Austria, Prussia, and Russia as a common spoil, partitioned among these three powers, and incorporated with their dominions. In its greatest prosperity it had at least 11,000,000 inhabitants, and an area of 350,000 sq. mi., and immediately before its first partition an area of about 282,000 sq. mi., stretching from the frontiers of Hungary and Turkey to the Baltic, and from Germany far east into Russia, forming one compact kingdom. With the exception of the Carpathians, forming its southwestern boundary, and a ridge of moderate elevation penetrating into it from Silesia, the country presents the appearance of an almost unbroken plain, composed partly of gently-undulating expanses, partly of rich alluvial flats, partly of sandy tracts, and partly of extensive morasses. Its principal streams are the Vistula, the Niemen, and the Dwina, all belonging to the basin of the Baltic; and the Dniester, South Bug, and Dnieper, with its tributary, Pripet, belonging to the basin of the Black Sea. The physical configuration of the country makes it admirably adapted for agriculture. Next to grain and cattle its most important product is timber.

The Poles, like the Russians, are a Slavonic race, and are first spoken of as the Polani, a tribe or people between the Vistula and Oder.

## Poland

The country was divided into small communities until the reign of Mieczyslaw I (962-992) of the Piast dynasty, who renounced paganism in favor of Christianity, and was a vassal of the German emperor. He was succeeded by Boleslaw the Great (992-1025), who raised Poland into an independent kingdom and increased its territories. In succeeding reigns the country was involved in war with Germany, the heathen Prussians, the Teutonic Knights, and with Russia. The last of the Piast dynasty was Casimir the Great (1364-70), during whose reign the material prosperity of Poland greatly increased. He was succeeded by his nephew, Louis of Anjou, king of Hungary, whose daughter, Hedwig, was recognized as "king" in 1384, and having married Jagello, prince of Lithuania, thus established the dynasty of the Jagellons, which lasted from 1386 to 1572. During this period Poland attained its most powerful and flourishing condition. In 1572 the Jagellon dynasty became extinct in the male line, and the monarchy, hitherto elective in theory, now became so in fact. The more important of the elective kings were Sigismund III (1587-1637), Wladislaw or Ladislaus IV (1632-48), John Casimir (1648-69), and the Polish general Sobieski, who became king under the title of John III (1674-96). He was succeeded by Augustus II, elector of Saxony, who got entangled in the war of Russia with Charles XII, and had as a rival in the kingdom Stanislaus Leszynski. Augustus III (1733-63) followed, and by the end of his reign internal dissensions and other causes had brought the country into a state of helplessness. In 1772, under the last feeble king Stanislaus Augustus (1764-95), the first actual partition of Poland took place, when about a third of her territories were seized by Prussia, Austria, and Russia, the respective shares of the spoil being Prussia 13,415 sq. mi., Austria 27,000 sq. mi., and Russia 42,000 sq. mi. What remained to Poland was completely under Russian influence. Another partition in 1793 gave Russia nearly 97,000 sq. mi. and Prussia 22,500 sq. mi. A third partition took place in 1795 after the heroic attempt of Kosciusko to save his country, and the last king of Poland became a pensionary of the Russian court. The successive partitions gave Russia upward of 180,000 sq. mi., Austria about 45,000 sq. mi., and Prussia 57,000 sq. mi. From 1815 to 1830 Russian Poland was a constitutional monarchy with the emperor as king, but the Poles, taking occasion of the French Revolution, at the latter date rashly engaged in an insurrection, which only hastened their complete absorption in Russia. The name Kingdom of Poland indeed remains, but all the autonomic institutions of the country have been swept away, and the whole country is being rapidly Russified. The Polish language has been entirely superseded by Russian in all courts of law, educational establishments, and public offices; and all official correspondence must be in Russian. The population in 1885 was 7,960,304, of whom fully 71 per cent. were Roman Catholics.

## Polar Expeditions

The Polish language belongs to the Slavic division of the Aryan or Indo-European tongues. It is remarkable for its flexibility, richness, power, and harmony; its grammatical structure is fully developed and established, and its orthography is precise. The Polish literature reaches back to a more remote period than that of any other Slavonic language except the Bohemian. The oldest monuments consist of warlike, historical, political, and religious poems, more especially the last; but the Latin language, fostered by the church, was used exclusively by Polish writers for several centuries. The "golden age" of Polish literature was from 1521 to 1621. To this period belong Nicolas Rej (d. 1568) and Jan Kochanowski (d. 1584), who both attained eminence as poets, the former in satire, allegory, didactic poetry, etc., the latter as a lyrical poet of the highest rank. Among the other poets of the century were Szarzynski (d. 1581), and Szymonowicz (Simonides), author of *Polish Idyls*. It was in the sixteenth century also that the first histories in the language of the people were written. This flourishing period of Polish literature was followed by a period of Jesuit supremacy and literary decline, which lasted till about the middle of the eighteenth century. About that time the influence of the French civilization was widely felt in Poland, and prepared the way for the revival of letters. The most distinguished authors of the latter part of the eighteenth century are Naruszewicz, who wrote odes, idyls, satires, etc., and Krasicki (1734-1801), who also distinguished himself in various fields. Among modern Polish poets may be noted Mickiewicz (1798-1855), Krasinski (1812-59), Slowacki (1809-49), Zaleski (1802-86). Kraszewski, novelist and political and historical writer, is one of the most prolific of present-day Polish authors. Most departments of literature have been successfully cultivated by modern Polish writers, but comparatively few have attained a European reputation.

**Polar Expeditions.** See *North Polar Expeditions* and *South Polar Expeditions*.

**Polariscope**, an optical instrument, various kinds of which have been contrived, for exhibiting the polarization of light, or for examining transparent media for the purpose of determining their polarizing power. The important portions of the instrument are the polarizing and analyzing plates or prisms, and these are formed either of natural crystalline structures, such as Iceland spar and tourmaline, or of a series of reflecting surfaces artificially joined together.

**Polarization of Light**, an alteration produced upon light by the action of certain bodies by which it is made to change its character. A common ray of light exhibits the same properties on all sides, but any reflected or refracted ray, or a ray transmitted through certain media, exhibits different properties on different sides, and is said to be polarized. The polarization of light may be effected in various ways, but chiefly in the following: 1, By reflection at a proper angle (the "polarizing angle") from the surfaces of transparent media, as glass,

## Polarization of Light

water, etc. 2, By transmission through crystals possessing the property of double refraction, as Iceland spar. 3, By transmission through a sufficient number of transparent uncrystallized plates placed at proper angles. 4, By transmission through a number of other bodies imperfectly crystallized, as agate, mother of pearl, etc. The knowledge of this singular property of light has afforded an explanation of some interesting phenomena in optics. The *plane of polarization* is that particular plane in which a ray of polarized light incident at the polarizing angle is most copiously reflected. When the polarization is produced by reflection the plane of reflection is the plane of polarization. According to Fresnel's theory, which is that generally received, the vibrations of light polarized in any plane are perpendicular to that plane. The vibrations of a ray reflected at the polarizing angle are accordingly to be regarded as perpendicular to the plane of incidence and reflection, and therefore as parallel to the reflecting surface. Polarized light cannot be distinguished from common light by the naked eye; and for all experiments in polarization two pieces of apparatus must be employed, one to produce polarization, and the other to show it. The former is called a *polarizer*, the latter an *analyzer*; and every apparatus that serves for one of these purposes will also serve for the other. The usual process in examining light with a view to test whether it is polarized, consists in looking at it through the analyzer, and observing whether any change of brightness occurs as the analyzer is rotated. There are two positions, differing by  $180^\circ$ , which give a minimum of light, and the two positions intermediate between these give a maximum of light. The extent of the changes thus observed is a measure of the completeness of the polarization of light. Very beautiful colors may be produced by the peculiar action of polarized light; as for example, if a piece of selenite (crystallized gypsum) about the thickness of paper is introduced between the polarizer and analyzer of any polarizing arrangement, and turned about in different directions, it will in some positions appear brightly colored, the color being most decided when the analyzer is in either of the two critical positions which give respectively the greatest light and the greatest darkness. The color is changed to its complementary by rotating the analyzer through a right angle; but rotation of the selenite, when the analyzer is in either of the critical positions, merely alters the depth of the color without changing its tint, and in certain critical positions of the selenite there is a complete absence of color. A different class of appearances are presented when a plate, cut from a uniaxial crystal by sections perpendicular to the axis, is inserted between the polarizer and the analyzer. Instead of a broad sheet of uniform color, there is exhibited a system of colored rings, interrupted when the analyzer is in one of the two critical positions by a black or white cross. Observations of this phenomenon affords in many cases

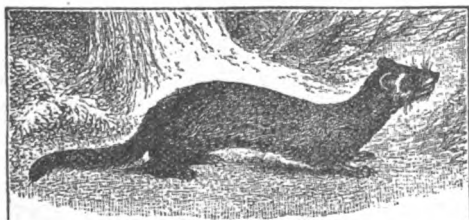


## Pole

an easy way of determining the position of the axis of the crystal, and is therefore a great service in the study of crystalline structure. Crystals are distinguished as dextro-gyrate or lævo-gyrate, according as their colors ascend by a right-handed or left-handed rotation of the analyzer horizontally. Glass in a state of strain exhibits coloration when placed between a polarizer and analyzer, and thus we can investigate the distribution of the strain through its substance. Unannealed glass is in a state of permanent strain. A plate of ordinary glass may be strained by a force applied to its edges by means of a screw. The state of strain may be varied during the examination of the plate by polarized light. A plate of quartz (a uniaxial crystal) cut at right angles to the optic axis exhibits, when placed between an analyzer and polarizer, a system of colored rings like any other uniaxial crystal; but we find that the center of the rings, instead of having a black cross, is brightly colored, red, yellow, green, blue, etc., according to the thickness of the plate.

**Pole**, the name given to either extremity of the axis round which the earth revolves. The northern one is called the *north pole*, and the southern the *south pole*. Each of these poles is 90° distant from every part of the equator. In astronomy, the name is given to each of the two points in which the axis of the earth is supposed to meet the sphere of the heavens, forming the fixed point about which the stars appear to revolve. In a wider sense a pole is a point on the surface of any sphere equally distant from every point of the circumference of a great circle of the sphere; or a point 90° distant from the plane of the great circle, and in a line passing perpendicularly through the center, called the axis. Thus the zenith and nadir are the *poles* of the horizon. So the *poles* of the ecliptic are two points of the sphere whose distance from the poles of the world is equal to the obliquity of the ecliptic, or they are 90° distant from every part of the ecliptic. *Pole*, in physics, is one of the points of a body at which its attractive or repulsive energy is concentrated, as the poles of a magnet, the north pole of a needle, the poles of a battery.

**Polecat**, a name common to several species of digitigrade carnivora of the weasel family.



Polecat.

The common polecat is found in most parts of America and Europe. Its body is about 17 in. long, and the tail 6 in. The color is dark brown. It is a nocturnal animal, sleeping during the day and searching for its prey at night.

## Police

It is especially destructive to poultry, rabbits, and game, as pheasants, so that in Britain it is being rapidly exterminated by gamekeepers, farmers, and others. Frogs, toads, newts, and fish are often stored as food by this voracious animal. It has glands secreting a fetid liquor, somewhat like that of the American skunk, which it ejects when irritated or alarmed. The name of "Foumart" is also applied to the polecat; and its fur, which is imported in large quantities from Northern Europe, is known as that of the "Fitch." Its hairs form a superior kind of artists' brushes.

**Pole Star**, the star of the constellation Ursa Minor, situated about 1° 20' from the north celestial pole, round which it thus describes a small circle. It is of the second magnitude, and is of great use to navigators in the northern hemisphere. Two stars called the pointers, in the constellation Ursa Major (the Great Bear, commonly called the Plow), always point in the direction of the pole star, and enable it to be found readily.

**Police** (po-lēs'), the system instituted by a community to maintain public order, liberty, and the security of life and property. In its most popular acceptance the *police* signifies the administration of the municipal laws and regulations of a city or incorporated town or borough. The primary object of the police system is the prevention of crime and the pursuit of offenders; but it is also subservient to other purposes, such as the suppression of mendicancy, the preservation of order, the removal of obstructions and nuisances, and the enforcing of those local and general laws which relate to the public health, order, safety and comfort. The term is also applied to the body of men by which the laws and regulations are enforced. A police force may be either open or secret. By an open police is meant officers dressed in their accustomed uniform, and known to everybody; while by a secret police is meant officers whom it may be difficult or impossible to distinguish from certain classes of citizens, whose dress and manners they may think it expedient to assume, in order that they may the more easily detect crimes or prevent the commission of such as require any previous combination or arrangement. This latter class of officer is termed in America and Great Britain, a *detective*.

In the U. S. each city has its own separate police administration. The organization of a uniformed municipal police is comparatively recent, even in the large cities; in New York it was not substituted for the inefficient night-watch until 1845. The present police organization of that city may be taken as representative of the American system generally. The department of police of the city of New York consists of a "board of police," comprising four commissioners appointed by the mayor, and the "police force" and officers appointed by the board. The city, with an area of 41½ sq. mi. and a pop. of 1,515,000, is divided into four inspection districts, which are subdivided into thirty-five precincts. At the head

## Polillo

of the force is a superintendent, under whom there are four inspectors, a captain over each precinct, sergeants, roundsmen (visiting officers), patrolmen (the body of the force), and doormen at the stations. There are also about a score of police surgeons. The general administration of the force is vested in the board of police, who make appointments, transfers, etc., hear charges against members of the force, and make rules and regulations for the discipline of the department. The orders, however, must not conflict with the constitution of the Union or of the state. The superintendent is the chief executive officer, and is appointed by the board, to whom he makes written quarterly reports; and he receives similar quarterly reports in writing from each of the inspectors. The captains report every morning to the central office. The roundsmen must see that the patrolmen are properly performing their duty, and the sergeants again are responsible for both roundsmen and patrolmen. Besides the general force, there are several "squad" organized for special duties. These include the "sanitary police company," whose members inspect buildings, premises, employments, ventilation, sewerage, etc., which are supposed to be dangerous to life or detrimental to health, report nuisances, and seize food unfit for consumption; officers of this company also act as school-board officers, and others, qualified as engineers, inspect steamboats and stationary steam boilers used for motive power in the city. The detective force is also a separate "squad;" and others are the mounted squad for duty near Central Park, the mounted patrol for rural precincts, the harbor police, the "ordinance squad" (for enforcing city ordinances), the Broadway squad (for aiding pedestrians in crossing during the day), special service squads, and others. On the board of police falls the duty of seeing that the streets are kept clean, and a bureau of street cleaning is appointed by the board to supervise this department. Another duty imposed upon the New York police relates to elections: all elections within the city are held under their direction; election officers are appointed by the board, to whom the returns are transmitted. In 1890 the police force of New York numbered 3,421 men, of whom 2,922 were patrolmen; this is one man to every 414 of the pop., and allows five patrolmen to every mile of street; the average annual cost of the force is \$4,391,766. The police force of Chicago in the same year numbered 1,624 (including a general superintendent, one inspector, a chief of detectives, and ten captains), and cost \$979,894; of Philadelphia 1,717, cost \$1,000,000; of Brooklyn 1,157, cost \$859,184; of St. Louis 613, cost \$475,408; of Boston 916, cost \$963,355; of Baltimore 782, cost \$677,914; of San Francisco 406, cost \$545,500 a year.

**Polillo**, one of the Philippine Islands, e. of Luzon; length 30 mi.; breadth 20 mi.

**Polishing** is the name given to the process by which the surface of a material is made to assume a perfectly smooth and glossy appear-

## Political Economy

ance, usually by friction. The article to be polished must first be made smooth and even, after which the polishing begins. In the case of wood the process is usually effected by rubbing with French polish. In metals, by polishing-steel or bloodstone, or by wood covered over with leather, and on which pulverized tripoli, chalk, tin-putty, etc., is sprinkled. In glass and precious stones, by tin-putty and lead siftings; in marble, by tin-putty and tripoli; in granite and other hard stones, by tripoli and quicklime.

**Political Economy**, the science of the social ordering of wealth, or the science which has as its aim the investigation of the social conditions regulating the production, distribution, exchange, and consumption of wealth, the term wealth being understood to mean all articles or products possessing value in exchange. While, however, political economy is susceptible of wide definition on these lines, the exact scope of the science within the terms of the definition has been the subject of much confused debate. From the nature of the actual conditions of the production and regulation of wealth, and the place of the systematic examination of these as departmental to a larger science investigating the natural laws of the formation and progress of civilized communities, it is impossible to sunder it entirely from the physical, intellectual, and moral considerations tending to enlarge indefinitely its scope. The varying extent to which these elements have entered into the treatment of the subject by economists has given rise to controversy not only as to whether economics is to be considered as a physico-mental or a purely mental science, but even as to its claim to be considered as an independent science at all. By most economists it is urged, that as the reasoned and systematic statement of a particular class of facts it may rightly claim to be considered as a science, while, as dealing with inanimate things only incidentally as the measure of motives of desire, it is to be classed with the moral or social sciences. Of more importance, as affecting the whole history of the science, have been the questions arising from the method employed in economic inquiry. The modern English school of economists, including the names of Adam Smith, Ricardo, Mill, Cairnes, Fawcett, and Marshall, have been mainly guided by the deductive method, its more extreme representatives, such as Senior, asserting this method to be the only one applicable to the science. In point of fact political economy has availed itself of both methods. It has been deductive in so far as it has assumed at the outset certain hypotheses, and derived from these by a dialectical process the guiding principles of the science; but even the older economists, working under the immediate influence of the mathematico-physical sciences chiefly, cannot be justly accused of having overlooked, though they tended to underestimate, the necessity of supplementing deduction by induction.

The hypothesis on which the economic system was founded, was that in the economic

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sphere the principal motive of human action was individual self interest, leading men to seek to obtain the greatest amount of wealth with the least expenditure of effort; this hypothesis being followed out to its logical conclusions, under assumed conditions of perfectly free competition, in connection with the facts of the limitations of the earth's extent and productiveness, and the theory of a tendency in the race to multiply to an incalculable extent in the absence of natural or artificial obstacles. On this basis theories of value, rent, and population were formed, having the character of laws, but of laws which were hypothetical merely—true only under the assumed conditions of an environment in which competition was free and frictionless, unhampered by inertness, ignorance, restrictive customs, and the like. In this respect the method adopted and the results arrived at found analogy in those physical sciences the laws of which are only applicable in actual fact under large and variable modification. There was, however, an indisputable tendency among the earlier economic writers to regard these hypothetical laws as in a greater degree representative of actual fact than they were, and even, when the actual facts fell short of the theoretic conditions, to regard these as prescriptive and regulative. The ethical protest against this tendency found a strong support in the development of the group of biological sciences, opening up new conceptions of organic life and growth; and as the result of these and other influences the old rigidity in the application of theory has largely disappeared. Where the older economist tended to look upon the subject-matter of economics as more or less constant and furnishing laws of universal application, the modern economist, having regard to the complexity and variability of human motives and the development of the race both in the matter of character and institutions, has come to recognize that the abstract conception of a frictionless competitive atmosphere, in which self-interested motives worked with mechanical regularity, can never bear other than a qualified application to actual economic conditions, and that laws relating to the economic aspects of life at one stage of human development seldom apply at another without large modification. He realizes clearly what the older economists only imperfectly perceived, and even more imperfectly expressed, that the system they were elaborating was to be considered rather as an instrument to assist in the discovery of economic truth, than a body of truths representing any actual or desirable social state. When regarded in this light—as a means to assist in the disentanglement of the complex motives operative in actual economic relations—the isolation of one set of economic forces, and the tracing of the logical issues of these, becomes of the highest value, despite the danger in careless use of neglecting necessary modification and of translating its hypothetic statements into prescriptions for conduct and social organization.

## Political Economy

It has been this neglect, the assumption of didactic authority, and the extent of the modifications often necessary in the practical application of theory which have tended to bring the older school into discredit at the hands of Comte, Cliff Leslie, Ruskin, and a large number of foreign economists—some complaining with Comte of the tendency to vicious abstractions, and the impossibility of isolating to any useful end the special phenomena of economics from other social phenomena; some, like the German and American historic schools, arguing that it is desirable and necessary to reason direct from historic facts to facts without the intervention of any formal economic theory. So far, however, the opponents of the older method of dealing with economic problems, though they have accomplished an admirable work in clearing the older economics of many confusions and misapprehensions, have failed to supply a superior method of analyzing the phenomena constituting the subject-matter of the science, while many of them have not scrupled to avail themselves largely of the results arrived at by the method they condemn. On the grounds of difference in method, and in conception of the scope of the science, the economists of to-day may be classified as forming four principal groups:—

1. The modern orthodox philosophic school, working as indicated above, on the basis of a body of hypothetical principles, constituting the statics of exchange and distribution, deductively arrived at by the consideration of the operations of motives of self interest in an environment of free and frictionless competition—principles imperfectly representing actual economic conditions, but of assistance, under due precautions, in the accurate analysis of these.

2. A group of mathematical economists allied to the philosophic school as working on the deductive basis, and largely engaged in translating philosophic theory into symbolic formulæ for retranslation into theory.

3. The historical school, denying the value of deductive economics, and seeking to confine the work of the economist to the description of the various stages of economic civilization as they have risen, and the indication, under due conditions of time, place, and national development, of such relative principles as may be discoverable in them.

4. A group of economic students who approach political economy from the point of view of previous training in "the sciences of inorganic and vital nature" (physics and biology as opposed to metaphysics), and who wish to include within the scope of economics the consideration of wealth as measured, not by subjective emotions and desires, but by the objective utility of things, the part played by them in the maintenance and evolution of society, the definitely determinable capacities they may possess of supplying physical energy and of improving the physiological constitution of the race. From this point of view, economics is to be regarded as "the di-



## Political Economy

rect study of the way in which society has actually addressed itself, and now addresses itself, to its own conservation and evolution through the supply of its material wants" (Ingram)—a study, therefore, inseparable from the study of sociology as a whole, and to be followed up under the immediate guidance or bias of a moral synthesis and a therapeutic aim.

The general scope of the science from the neo-orthodox standpoint may be broadly indicated under four heads:—

I. Production: dealing with the requisites of production—Land (natural agents), Labor, and Capital; the law of fertility of land (law of diminishing returns); the laws of growth of population and capital; the organization of industry, division of labor, etc.

II. The pure theory of values or theory of normal (natural) values, i. e., of values as they would arise in a market where competition was free and undisturbed. Under this head are discussed the relations of value and utility; the laws of supply and demand; cost and expenses of production; the law of rent and the relation of rent to value; the considerations determining the normal share of the various classes of producers in the value of the product; the laws of supply and demand in relation to skilled and unskilled labor and to capital; the laws of wages and earnings, etc.

III. The application of the pure theory of values under the conditions of actual trade—internal and international; treating of the medium of exchange; the influence of changes in the purchasing power of money; influence of modern credit systems; the influence upon prices and wages and profits of local customs, monopolies, combinations, trades unions, co-operation, etc.; the conditions of foreign exchange; the competition of different countries in the same market, and the like.

IV. The economic functions and influence of government: dealing with Taxation, direct and indirect; the opposing principles of Protection and Laissez-faire, etc.

In the last division the treatment inevitably takes the form not merely of setting forth what is, but of discussing what ought to be; in other words, the method is no longer that of a science aiming at the systematized representation of facts, but rather that of an art, seeking to prescribe and regulate for ethical and prudential reasons the industries and commerce of nations. In this respect a large portion of the discussions usually ranged under this head might well be considered as forming with certain other pressing problems of economic reform a distinct branch of the subject, which may be provisionally described as prescriptive or regulative or therapeutic economics. To this branch would belong the various problems touching the fair share of the different productive classes in the value of the product, and indeed the investigation of the whole question of property in relation to the various schemes of distribution—individualistic, socialistic, and communistic. The frequent mixture of these considerations of

## Political Economy

practical economic reform with the non-moral and indifferent systematization of contemporary economic fact has been a most fertile source of confusion and misunderstanding.

As a separate scheme of knowledge meriting the title of a science, political economy is little more than a century old, but the germs of modern economic doctrines are to be traced long previous. In Greece, Plato, Xenophon, and Aristotle alike conducted investigations in economics from an ethical point of view and in subordination to the theory of the state, the last, however, showing a perception of the difference between value in use and value in exchange, of the advantages of division of labor, of the functions of money as a measure of value and an instrument of exchange, of the desirability of maintaining a proportion between population and territory. The Romans followed, without advancing upon, the economics of the Greeks. Cicero opposed manufactures and trade, upholding, in the main, like Cato and Varro, an agrarian ideal; Pliny condemned the effects of servile labor and the exportation of money, and discussed some of the problems connected with value. After the fall of Rome it is not till the latter part of the Middle Ages that we find the emancipation of the towns and the development of the burgher class admitting of industry and commerce on a wide scale. In the thirteenth century St. Thomas Aquinas paraphrased the doctrines of Aristotle on money and interest, establishing on them a condemnation of interest. His influence lasted into the next century, among the principal writers of which were Bartolo di Sassoferrato, Jean Buridan, and Nicholas Oresme, the latter the author of the fullest treatise on money written up till his time. Gabriel Biel, F. Patrizzi, and Diomedes Caraffa are the chief names of the fifteenth century, the study of economics being chiefly pursued by ecclesiastics until the collapse of mediævalism in the sixteenth century. The main economic topics continued to be the nature and functions of money, the legitimacy of usury, institutions of credit, and *monti di pietà*. Chief among the sixteenth century writers are the names of Jean Bodin in France, and in England the writer W. S. (probably William Stafford), who worked in part from Bodin, Sir Walter Raleigh, Gilbert, Hackluyt, and Peckham. The characteristic doctrines developed at this time came to be known as the mercantile system, or Colbertism, and found expression in the close of the sixteenth and beginning of the seventeenth centuries chiefly in the writings of Antonio Serra in Italy, Antoine de Montchrétien in France, and Thomas Mun in England. They were opposed by a few early advocates of free trade, including Emélique de Lacroix in France, and Alberto Struzzi in Spain. In the second half of the seventeenth century considerable advances were made by Hobbes, Locke, Sir Joshua Child, Sir William Petty, and Sir Dudley North, and the foundation of the Bank of England gave rise to much controversy early in the eighteenth century, leading to more enlarged

## Political Offenses

conceptions of the operations of credit. In France, Boisguillebert and Vauban opposed Colbertism, and Montesquieu endeavored to work out the economics of government finance. The foundation of the physiocratic school by Quesnay was, however, the chief economic movement of the eighteenth century in France, among its exponents being the elder Mirabeau, De la Rivière, Baudeau, Le Trosne, Dupont de Nemours, Gournay, and especially Turgot, the greatest of the group. It made some little way in Italy and Germany; but its direct influence was not marked in England, where Hume's *Economic Essays* were followed by Adam Smith's epoch-making *Wealth of Nations*, directed against mercantilists and physiocrats alike. New elements were introduced by the population theory of Malthus, and the theory of rent enunciated by Ricardo on the lines indicated by Anderson and West; and the statistical side was developed by Thomas Tooke. In reducing the teaching of Adam Smith to system, the French economist Say played an influential part, and the work was advanced still further by the labors of Torrens, James Mill, M'Culloch, Whately, Senior, and other minor writers. No work, however, after the *Wealth of Nations* exercised so wide an influence as that of John Stuart Mill, who, despite the signs of revolt, to which allusion has been made, still dominates popular economic thought for good and ill. The names of Longe, Leslie, Thornton, and Cairnes may be noted among the earlier critics or commentators of Mill; while Marshall, working on the basis of Mill, has more accurately defined the limitations of the deductive method in seeking to formulate and apply a pure theory of values. Among other recent writers of importance have been W. Stanley Jevons (mathematical and statistical group), Carl Marx (Socialist), Roscher (historical), Sidgwick (eclectic), L. G. Ely, and F. A. Walker.

**Political Offenses** are those offenses considered injurious to the safety of the state, or such crimes as form a violation of the allegiance due by a subject to the recognized supreme authority of his country. In modern times the crimes considered political offenses have varied at different periods and in different states. The most serious political offenses are termed treason, and those of a lighter nature, which do not aim at direct and open violence against the laws, but which excite a turbulent and discontented spirit which would likely produce violence, are termed sedition. In the U. S., and in most of the countries of Europe, the extradition treaties do not include the giving up of political offenders.

**Political Parties in the U. S.**—The first distinctive political division in this country during the period of the Revolution was that occasioned by the agitation preceding the Continental Congress which met in Philadelphia Sept. 5, 1774, and remained in session with closed doors for six weeks. The members of this congress called themselves Colonial Whigs, and adopted a non-importation, non-exportation, and non-consumption agreement, binding

## Political Parties in the U. S.

on the colonies, and addressed a petition to the king of England and the people of Great Britain, in which it hoped to be supported by the great mass of the patriots of the colonies. The great struggle which followed in a measure obliterated the issues which the Colonial Whigs had sprung, but as soon as peace was declared a strong party arose which was actuated by the dread of a centralized power, in opposition to the views in favor of a "strong government" expressed by Hamilton, Adams, Jay, and others, the former being termed Democrats, or Democratic Republicans, and the latter Federalists. The agitation of the questions connected with this issue resulted in the calling of a Constitutional Convention, which met in Philadelphia in 1787, presided over by General Washington. Hamilton, the leading Federalist in the country, was mainly instrumental in calling this convention together, and his views prevailed in the instrument put forth to such an extent that the anti-Federalists began an agitation for amending the Constitution, and an extra session of Congress was called, at which ten amendments were made to it, embodying freedom of speech and of the press, together with religious liberty, to all of which principles the Federalists were presumed to be adverse. The Federalists were in favor of Congress assuming the state debts incurred during the Revolutionary War, and the passage of that measure in 1789 exasperated the Republicans beyond measure. The next issue between the parties was the chartering by Congress of a United States Bank, with a capital of \$10,000,000, which was violently opposed by the Republicans. The anti-Federal party manifested its feeling in favoring a union with France in her war with England, which the second administration of Washington, under federal influences, strongly and wisely opposed. The election of the succeeding administration, that of Jefferson, was a complete triumph of the Republican party, of which Jefferson was the especial apostle.

During Madison's administrations the Democratic clubs made their appearance, opposing the action of the Republican majority in Congress in its hostile action toward France. About this time the Federalists succeeded in passing through Congress a bill which proved to be so unpopular as to ring the death knell of their party. It was called the Alien and Sedition act. It gave the president power to banish from the country anyone whom he considered dangerous to the public peace, or to fine and imprison such persons as he should suppose to be guilty of conspiring together to oppose any measure of the government. The Republicans not long afterward passed the Virginia and Kentucky resolutions, which went to the opposite extreme of radicalism. It may be mentioned that Hamilton himself had little sympathy with republican institutions. Hildreth, the historian, says that "in private conversation he did not disguise his opinion that to save her liberties from attack or intestine commotions, America might yet be driven into serious alterations of her constitution, giving

## Political Parties in the U. S.

to it more of a monarchical and aristocratic cast."

The Republicans had gained strength and influence under Jefferson's two administrations. They now began to call themselves Democratic Republicans, or Republican Democrats, and one of their especial tenets was in sympathy with France as against England; and it constituted one of the most difficult tasks of Jefferson's administration to prevent the strong feeling everywhere prevalent against England from drawing the country into a war with her.

Ever since the organization of the constitutional government in 1787 the country had been divided between strict and loose or liberal constructionists of the Constitution, and the latter embraced the advocates of a U. S. bank, a protective tariff, and internal improvements. The anti-Federalists or Republicans had from the first objected to these measures on the ground that the Constitution authorized no such assumption of authority on the part of the government, while their opponents held to the largest discretionary power on the part of the executive in such matters. The first sharp issue in this respect was the memorable struggle concerning the removal of the deposits from the U. S. Bank by order of President Jackson, who had been elected as the Democratic president, the name Republican having been dropped. From this time on, the opposition was known as the Whig party, and under the lead of Henry Clay was pronounced in its advocacy of internal improvements and a protective tariff. The Free-Soil party arose with the nomination of Martin Van Buren as a bolting Democratic candidate against Lewis Cass in 1848. In 1856, as a result of the agitation over the repeal of the Missouri Compromise, the Republican party sprang into existence from the remnants of the old Whig and the Free-Soil parties, and nominated John C. Fremont for president. A portion of the Whigs who refused to join the coalition nominated Millard Fillmore for president, and were known as Silver Grays. The term Old Hunkers, Woolly Heads, Barnburners, etc., had more especially a local application, having reference to the divisions of the Democratic and Whig parties in the state of New York.

Just preceding the Civil War, the issue of state rights became very prominent and incisive, and its persistent agitation contributed largely toward bringing on the great national conflict. The leaders of the old Democratic party in the South urged the extreme views on the rights of the states, embracing that of secession, which the new Republican party strenuously opposed. The election of Lincoln in 1860 was considered a *casus belli*, embodying all the leading principles against which the South had for years vehemently protested. The Republican party upon coming into power, proceeded to put down the rebellion, and to enact a strong protective tariff. After the war was closed it completed the work of reconstruction, and resumed specie payments which had been suspended during the progress of the war. Since the conclusion of the

## Pollok

war the Democratic party has twice come into power—once by the election of Grover Cleveland in 1884, and again by his re-election in 1892.

The Greenback party, which opposed the measure for resumption of specie payments, was organized in 1874. Following this came the Labor party, which in 1891 merged into the People's party. In 1896 this party took the name of Populists, and merged with those republicans and democrats who favored the free coinage of silver on the basis of the value of gold to silver of 16 to 1. The same issue was raised again in 1900. The Republicans were successful in each of these elections.

**Polk, JAMES KNOX** (1795-1849), eleventh president of the United States; born in Mecklenburg co., N. C., Nov. 2, 1795; educated in the University of North Carolina. He was admitted to the bar in 1820, at Nashville, Tenn., to which state his parents had removed in 1806. In 1823, he was elected to the legislature, and was representative in Congress from 1823 to 1839. He was elected Speaker of the House in 1835 and re-elected in 1837. In 1840, he became governor of Tennessee, but was defeated in the election of 1841. Mr. Polk was an able lawyer and a forceful public speaker. He was a strenuous opponent of internal improvements, a protective tariff and a national bank, and a strong advocate of the annexation of Texas. His position on the Texas question secured for him the Democratic nomination for president in 1844. At the election he received 170 electoral votes to 105 for Henry Clay, the Whig candidate. Polk was inaugurated March 4, 1845, and formed a strong cabinet, composed of such men as Buchanan for the State Department, R. J. Walker for the Treasury, Marcy for the War Department, and the historian Bancroft for the Navy. His administration is memorable for several important events. The first of these was the Mexican war, which gave the U. S. a large accession of territory. The others were the adoption of the law tariff of 1842, the establishment of an independent treasury, the creation of the department of the interior and the settlement of the Oregon boundary. Mr. Polk died June 15, 1849.

**Pollen**, the male element in flowering plants; the fine dust or powder which by contact with the stigma effects the fecundation of the seeds. To the naked eye it appears to be a very fine powder, and is usually enclosed in the cells of the anther; but when examined with the microscope it is found to consist of hollow cases, usually spheroidal, filled with a fluid in which are suspended drops of oil from the 20,000th to the 30,000th of an inch in diameter, and grains of starch five or six times as large. Impregnation is brought about by means of tubes (pollen tubes) which issue from the pollen grains, adhering to the stigma, and penetrate through the tissues until they reach the ovary.

**Pollok, ROBERT** (1799-1827), a Scottish poet, was b. at Muirhouse, in the parish of Eaglesham, Renfrewshire. He was educated at Glasgow University, studied divinity, and was licensed as a preacher in 1827. He is the author



## Poll Tax

of a series of *Tales of the Covenanters*, and a blank-verse poem, *The Course of Time*, which in spite of many faults has enjoyed a wonderful popularity.

**Poll Tax.**—In the U. S. most states impose a poll tax or capitation tax as a condition of the suffrage; the sum being generally \$1, but in some states only 50 cents, and in others varying from year to year, but not exceeding \$3. A considerable number have no such tax; in others the imposition of a poll tax is expressly prohibited by the constitution.

**Polo**, a game at ball resembling hockey. The players are mounted on ponies, and wield a "mallet" 4 ft. 4 in. in length (a stick with a crook at the end). It is played by sides, and the object is to drive the ball from the center of the ground through either of the goals, the side gaining the most goals being the winner.

**Polo, MARCO** (1256-1323), Venetian traveler. His father Nicolo was the son of Andrea Polo, a patrician of Venice. Shortly before Marco's birth, Nicolo with his brother Matteo set out on a mercantile expedition, and ultimately arrived at Kamenfu, on the frontiers of China, where they were favorably received by Kubilai, the grand khan of the Mongols. In 1266 the khan sent the brothers on a mission to the pope, and they arrived in Venice in 1269. Two years later they again set out for the East, this time accompanied by the young Marco. After reaching the court of Kubilai, Marco rapidly learned the language and customs of the Mongols, and became a favorite with the khan, who employed him on various missions to the neighboring princes. Soon afterward he was made governor of Yang-tchou, in Eastern China, an appointment he held for three years. In 1292 the three Polos accompanied an escort of a Mongolian princess to Persia. After arriving at Teheran they heard of Kubilai's death, and resolved to return home. They reached Venice in 1295. In the following year Marco Polo took part in the naval battle of Curzola, in which he was taken prisoner. During his captivity he dictated to a fellow prisoner, Rustichello or Rusticiano of Pisa, an account of all his travels, which was finished in 1298. After his liberation he returned to Venice, where he died. His book—known as the *Book of Marco Polo*—created an immense sensation among the scholars of his time, and was regarded by many as pure fiction. It made known to Europeans the existence of many nations of which they were formerly totally ignorant, and created a passion for voyages of discovery. It has gone through numerous editions in the various European languages, but the best is that of Colonel (Sir Henry) Yule, accompanied with a great amount of learned elucidation and illustration. It was originally written in French, but Latin and Italian MSS. of it are more common.

**Polta'va** (or Pultawa), a government of Russia, bounded by Czernigov, Kharkov, Ekaterinoslav, Kherson, and Kiev; area 19,265 sq. mi. It consists of an extensive and somewhat monotonous flat, watered by several tributaries of the Dnieper. It is one of the most fertile

## Polychromy

and best cultivated portions of the Russian Empire, and grows large quantities of grain. Live stock and bee rearing are important branches of the rural economy. Both manufactures and trade are of very limited extent. Education is very neglected. Pop. 2,520,887. Poltava, the capital, at the confluence of the Poltava with the Worskla, has straight and broad streets, a cathedral, important educational institutions, etc. As a place of trade Poltava derives importance from the great fair held on July 20 each year. Wool is the great staple of trade. Horses, cattle, and sheep are likewise bought and sold in great numbers. It contains a monument to Peter the Great, who here defeated Charles XII in 1709. Pop. 41,250.

**Polyb'ius** (204-122 B.C.), a Greek historian, was b. at Megalopolis, in Arcadia. Educated for arms and political life he entered, at the age of twenty-four years, into the military and political service of the League. After the subjugation of Perseus, king of Macedonia, by the Romans (168), Polybius found himself among the 1,000 Achæans summoned to Rome to answer before the senate why the League had not aided the Roman army in Macedonia. While in Italy he formed an intimate friendship with Scipio Æmilianus, whom he accompanied on his African campaign, and witnessed the destruction of Carthage. He returned to Greece in 146, just after the fall of Corinth, and exerted himself successfully to obtain moderate terms from the Romans for his countrymen. His principal work is his history of Rome.

**Pol'ychromy**, the name given to the art of decorating works of sculpture and architecture with different colors. The custom of painting statues is as ancient as sculpture itself; the Egyptians, Assyrians, Phœnicians, Babylonians, and Persians all painted their statues in various colors, especially in red. Polychromy, however, only reached the dignity of a real art among the Greeks. Instead of employing colors, the sculptors of the age of Pericles generally used marbles of different colors fitted together, and the ornaments of their statues were made of various metals and of ivory. Thus the nude parts were, in some cases, of Parian marble, the draperies of streaked onyx, the eyes of gold or ivory, the shields and other arms of bronze, etc. Architectural polychromy may be divided into natural polychromy, in which the materials employed produce certain effects by their natural colors; and artificial polychromy, which is simply the application of coats of paint, whether on the exterior or interior parts of the edifice. Both natural and artificial polychromy were used by the Egyptians, Assyrians, Babylonians, and Persians. Polychromy was cultivated by the Romans in a much more restricted style. In the public buildings of the later Romans gold decorations and facings of variegated stone were used instead of mere colors. In the Middle Ages polychrome architecture was adopted by the Arabs and Byzantines. A fine example of Byzantine archi-

## Polycrates

ecture in polychrome style is the Palatine Chapel at Palermo, erected in 1232. On the establishment of Gothic architecture polychromy was introduced into the interior of churches. This practise was maintained throughout the Middle Ages.

**Polyc'ratēs**, Greek tyrant or absolute ruler of Samos during the time of the elder Cyrus. He made himself master of the island by violence, and having secured absolute sway seized upon several of the neighboring islands and some towns upon the mainland. In 522 B.C. the Persian satrap Oroetes treacherously invited Polycrates to his palace, and there crucified him. Polycrates seems to have had much taste for learning and the arts, and greatly promoted the refinement of the Samians.

**Polyg'amy** consists in a man's having more than one wife at the same time. In ancient times polygamy was practised by all the Eastern nations, and was sanctioned or at least tolerated by their religions. It was permitted to some extent among the Greeks, but entirely disappeared with the later development of Greek civilization. To the ancient Romans and Germanic races it was unknown. It prevailed among the Jewish patriarchs both before and under the Mosaic law. But in the New Testament we meet with no trace of it. Polygamy has never been tolerated among Christians, although the New Testament contains no injunction against it. It is, however, practised by the Mohammedans.

**Polyhym'nia** (or Polym'nia), among the Greeks, the muse of the sublime hymn, and according to some of the poets, inventress of the lyre, and of mimes. She is usually represented in art as covered with a white mantle, in a meditative attitude, and without any attribute.

**Polyne'sia**, a general name for a number of distinct archipelagoes of small islands scattered over the Pacific Ocean, the Philippines, New Guinea, Australia, and New Zealand being excluded. The islands are distributed into numerous groups, having a general direction from n.w. to s.e. The groups north of the equator are the Pelew, Ladrone or Marianne, Caroline, Marshall, Gilbert or Kingsmill, Fanning, and Hawaii or the Sandwich Islands. South of the equator are New Ireland, New Britain, Solomon Islands, New Hebrides, Fiji, New Caledonia, Navigator, Friendly, Cook's or Harvey, and the Society Islands, the Low Archipelago, the Marquesas Islands, and the isolated Easter Island. The term Polynesia is sometimes restricted to the groups most centrally situated in the Pacific; the New Hebrides, Solomon Islands, New Britain, New Ireland (Bismarck Archipelago), etc., being classed together as Melanesia, whereas the Carolines, Ladrone, Marshall Islands, etc., form Micronesia. The islands may be divided into two chief classes, volcanic and coral islands. Some of the former rise to a great height, the highest peak in the Pacific, Mauna Kea, in Hawaii, reaching 13,895 ft. The principal groups of these are the Friendly, the Sand-

## Polytheism

wich, the Marquesas, and the Navigator Islands. The coral islands comprise the Carolines, Gilbert, and Marshall Islands on the northwest, and the Society Islands and Low Archipelago in the southeast, in both of which groups the *atoll* formation is very common, besides numerous other groups where coral reefs occur. The elevations of these groups do not exceed 500 ft. Polynesia has a comparatively moderate temperature, and the climate is delightful and salubrious. The predominating race, occupying the central and eastern portion of Polynesia, is of Malay origin, with oval faces, wide nostrils, and large ears. The hair and complexion vary greatly, but the latter is often a light brown. Their language is split up into numerous dialects. The other leading race is of negroid or Papuan origin, with negro-like features and crisp mop-like hair. They are confined to Western Polynesia, and speak a different language, with numerous distinct dialects. Christianity has been introduced into a great many of the islands, and a large number of them are under the control of one or other of the European powers. Many atrocities have been practised on the natives in recent times in connection with the luring or kidnapping of them to work in the European settlements. The commercial products consist chiefly of cocoanuts, cotton, coffee, sugar, fruits, pearls, and trepang. The Ladrone were discovered by Magellan in 1521, the Marquesas by Mendaña in 1595, but it was not until 1767 that Wallis, and subsequently Cook, explored and described the chief islands. Since the natives came in contact with the whites their numbers have greatly decreased. For further information see articles on the individual groups and islands.

**Polyphe'mus**, in Greek mythology, the most famous of the Cyclops, who is described as a cannibal giant with one eye in his forehead, living alone in a cave of Mount Ætna and feeding his flocks on that mountain. Ulysses and his companions having been driven upon the shore by a storm, unwarily took refuge in his cave. Polyphemus, when he returned home at night, shut up the mouth of the cavern with a large stone, and by the next morning had eaten four of the strangers, after which he drove out his flocks to pasture, and shut in the unhappy captives. Ulysses then contrived a plan for their escape. He intoxicated the monster with wine, and as soon as he fell asleep, bored out his one eye with the blazing end of a stake. He then tied himself and his companions under the bellies of the sheep, in which manner they passed safely out in the morning. Polyphemus was the despised lover of the nymph Galatea.

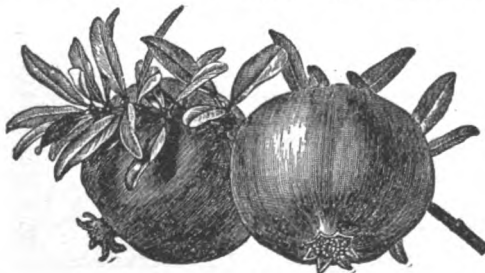
**Polythe'ism**, the belief in, and worship of, a plurality of gods; opposed to monotheism, the belief in, and worship of one god. It is still a matter of debate whether polytheism is a primary form of human belief, or a degeneration of an original monotheistic idea. It is argued, on the one hand, that the sense of personal dependence, the feeling that there was an

## Pombal

undefined power, a mysterious *something* around and above him, did not primarily present itself to the mind of man except under a form of unity. His earliest religion would therefore be of a monotheistic character, but of a highly unstable nature, and eminently liable, among races of rude faculties and little power of abstraction, to assume a polytheistic form, the idea of one Supreme Being being readily obscured by the multiplicity of the visible operations of that being on earth. Those who affirm that polytheism was a primary form of religious belief, argue that man, ignorant of the nature of his own life, and of the nature, origin, and properties of other objects, could at first only attribute vaguely to all visible things the same kind of conscious existence as that which belonged to himself. Thus the sun, moon, and stars would all be living beings; and their influence, from the absence of any idea of a natural order, would be seen in the working of the material world, and in all the accidents of human life. As being beyond human control, and as affecting the condition of men, they would be loved or feared; and with the growth of the idea that they might be propitiated or appeased the system of polytheism would be complete.

**Pombal** (pon'bal), SEBASTIAO JOSÉ CARVALHO, MARQUIS OF (1699-1782), a Portuguese diplomat and statesman. After serving his government six years as envoy extraordinary to London, he was sent in the same capacity to Vienna, where he gained such favor with King Joseph that he was appointed minister of foreign affairs. He succeeded in regaining for the crown a great number of provinces which had become alienated, reorganized the army, sent colonists to Portuguese settlements, introduced into Brazil the cultivation of coffee, sugar, cotton, indigo, rice and cacao, and freed the Indians from slavery. Always an enemy to the Jesuits, he for years persecuted them and finally led the King to issue a decree banishing them from the kingdom. At the accession of Maria, Pombal fell from favor and retired to his castle.

**Pomegranate** (pom'gra-nāt), a dense spiny shrub, from 8 to 20 ft. high, supposed to have



Pomegranate.

belonged originally to the north of Africa, and subsequently introduced into Italy. The leaves are opposite, lanceolate, entire, and smooth; the flowers are large and of a brilliant red; the fruit is as large as an orange, having a

## Pompeii

hard rind filled with a soft pulp and numerous red seeds. The pulp is more or less acid and slightly astringent. The pomegranate is extensively cultivated throughout Southern Europe, and sometimes attains a great size. Another species inhabits the West Indies and Guiana.

**Pomera'nia**, a province of Prussia, bounded by the Baltic, Mecklenburg, Brandenburg, and West Prussia; area 11,622 sq. mi. The coast is low and sandy and lined by numerous lagoons. The chief islands along the coast are Rügen, Usedom, and Wollin. The interior is flat and in parts, marshy. The principal rivers are the Oder, Persante, and Stolpe. The soil is generally sandy and indifferent, but there are some rich alluvial tracts, producing a quantity of grain. Flax, hemp, and tobacco are also cultivated. Domestic animals are numerous. The forests are of large extent. Fish is abundant. There are few minerals. Manufactures include woolen and other fabrics. A considerable general and transit trade is carried on. The center of trade is Stettin, which ranks as one of the chief commercial cities of Prussia. Pomerania appears to have been originally inhabited by Goths, Vandals, and Slavs. The first mention of it in history is in 1140. It long remained an independent duchy, and in 1637, on the extinction of the ducal family, it was annexed to Sweden. On the death of Charles XII it was ceded to the electoral house of Brandenburg, with the exception of a part which subsequently was also obtained by Prussia. For administrative purposes it is divided into three governments, Stettin, Köslin, and Stralsund. Pop. 1,505,575.

**Pomeroy**, Meigs co., O., on Ohio River, 220 mi. n. of Cincinnati. Railroads: C. H. V. & T.; K. & M.; and Ohio River. Industries: iron and steel co., two flouring mills, iron foundry, four salt works, and a large furniture factory. Oil and natural gas undeveloped. Surrounding country agricultural. The town was first settled in 1816 and became a city in 1840. Pop. 1900, 4,639.

**Pomo'na**, among the Romans, the goddess of fruit, and wife of Vertumnus. At Rome she was usually represented with a basket of fruit, or with fruit in her bosom.

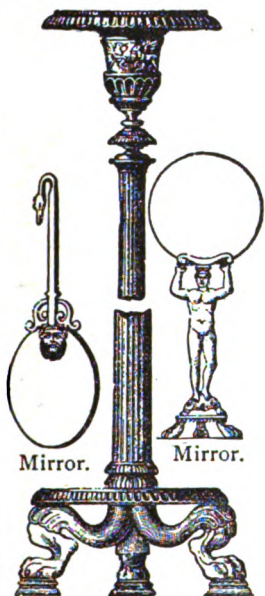
**Pomo'na**, or mainland, the largest and most populous of the Orkney Islands; length from n.w. to s.e., 23 mi.; extreme breadth about 15 mi., but at the town of Kirkwall only about 2½ mi.; area 150 sq. mi.; pop. 17,165.

**Pompeli** (pom-pā'yī), an ancient city of Italy, in Campania, near the Bay of Naples, about 12 mi. s.e. from the city of that name, and at the base of Mount Vesuvius on its southern side. Before the close of the republic, and under the early emperors, Pompeli became a favorite retreat of wealthy Romans. In A.D. 63 a fearful earthquake occurred, which destroyed a great part of the town. The work of rebuilding was soon commenced, and the new town had a population of some 30,000 when it was overtaken by another catastrophe on Aug. 24, A.D. 79. This consisted in an eruption of Mount Vesu-





Lamp.



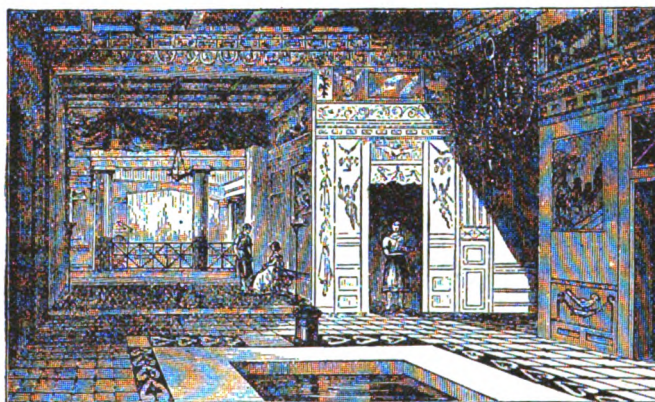
Mirror.

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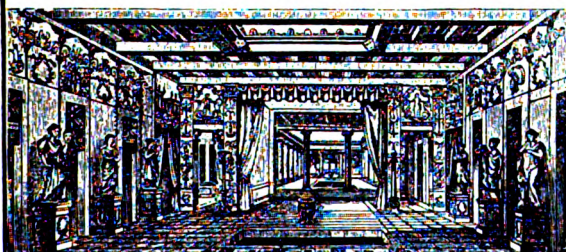
Candle-stick.



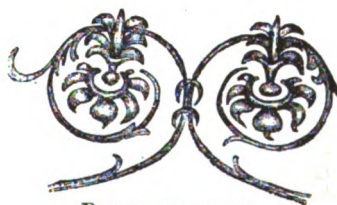
Tomb-street and Herculaneum gate.



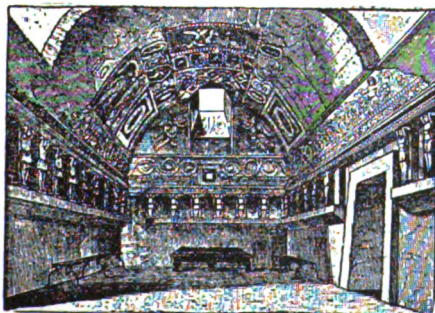
House of the tragic poet.



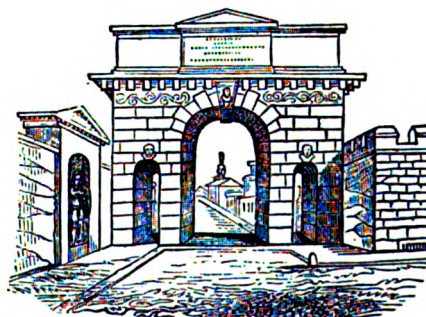
House of Pansa.



Bronze ornament.



Hot bath.



Principal gate.

## Pompey

vius, which suddenly belched forth tremendous showers of ashes, red-hot pumice stone, etc., so as to overwhelm the city to a considerable depth. The present superincumbent mass is about 20 ft. in thickness. A portion of this was formed by subsequent eruptions, but the town had been buried by the first catastrophe and entirely lost to view. Pompeii was consigned to oblivion during the Middle Ages, and it was not until 1748, when a peasant in sinking a well discovered a painted chamber with statues and other objects of antiquity, that anything like a real interest in the locality was excited. Excavations were now prosecuted, and in 1755 the amphitheater, theater, and other parts were cleared out. Under the Bourbons the excavations were carried out on a very unsatisfactory plan. Statues and articles of value alone were extricated, while the buildings were suffered to fall into decay or covered up again. To the short reign of Murat (1808-15) we are indebted for the excavation of the Forum, the town walls, the Street of Tombs, and many private houses. Latterly the government of Victor Emmanuel assigned \$12,500 annually for the prosecution of the excavations, and a regular plan has been adopted, according to which the ruins are systematically explored and carefully preserved. The town is built in the form of an irregular oval extending from east to west. The circumference of the walls amounts to 2,925 yds. The area within the walls is estimated at 160 acres; greatest length,  $\frac{3}{4}$  mi.; greatest breadth,  $\frac{1}{4}$  mi. There are eight gates. The streets are straight and narrow and paved with large polygonal blocks of lava. The houses are slightly constructed of concrete, or occasionally of bricks. Numerous staircases prove that the houses were of two or three stories. The ground floor of the larger houses was generally occupied by shops. Most of the larger houses are entered from the street by a narrow passage leading to an internal hall which provided the surrounding chambers with light and was the medium of communication; beyond the latter is another large public apartment termed the *tablinum*. The other portion of the house comprised the private rooms of the family. All the apartments are small. The shops were small and all of one character, having the business part in front and one or two small chambers behind, with a single large opening serving for both door and window. The chief public buildings are the so-called Temple of Jupiter, the Temple of Venus, the Basilica, the Temple of Mercury, the Curia, and the Pantheon or Temple of Augustus. There are several interesting private buildings scattered through the town, including the villa of Diomedes, the house of Sallust, the house of Marcus Lucretius. The Museum of Naples owes many of its most interesting features to the ornaments, etc., found in the public and private edifices above mentioned.

**Pompey**, in full, CNEIUS POMPEIUS MAGNUS (106-48 B. C.), a distinguished Roman. In B.C. 89 he served with distinction under his father in the war against the Italian allies.

## Ponce de Leon

In the struggle between Marius and Sulla, Pompey raised three legions to aid the latter, and regained all the territories of Africa which had forsaken the interest of Sulla. This success excited the jealousy of Sulla, who recalled him to Rome. On his return Sulla greeted him with the surname of Magnus (Great). Pompey demanded a triumph, to which Sulla reluctantly consented. He entered Rome in triumph in September, 81, and was the first Roman permitted to do so without possessing a higher dignity than that of equestrian rank. After the death of Sulla, Pompey put an end to the war which the revolt of Sertorius in Spain had occasioned, and in 71 obtained a second triumph. In this year, although not of legal age and without official experience, he was elected consul with Crassus. In 67 he cleared the Mediterranean of pirates, and destroyed their strongholds on the coast of Cilicia. In the four years, 65-62, he conquered Mithridates, Tigranes, and Antiochus, king of Syria. At the same time he subdued the Jews and took Jerusalem by storm. He returned to Italy in 62 and disbanded his army, but did not enter Rome until the following year, when he was honored with a third triumph. Pompey, in order to strengthen his position, united his interest with that of Caesar and Crassus, and thus formed the first triumvirate. This agreement was concluded by the marriage of Pompey with Caesar's daughter Julia; but the powerful confederacy was soon broken. During Caesar's absence in Gaul Pompey ingratiated himself with the senate, was appointed sole consul, and the most important state offices were filled with Caesar's enemies. Through his influence Caesar was proclaimed an enemy to the state, and his rival was appointed general of the army of the republic. Caesar crossed the Rubicon in 49 (see *Caesar*), and in sixty days was master of Italy without striking a blow. Pompey crossed over to Greece, and in this country, on the plains of Pharsalia, occurred the decisive battle which made Caesar master of the Rome world. Pompey fled to Egypt, where he hoped to find a safe asylum. The ministers of Ptolemy betrayed him, and he was stabbed on landing by one of his former centurions.

**Ponce de Leon** (pon'the de le-on'), JUAN (1460-1521), one of the early Spanish discoverers in America. He accompanied Columbus on his second expedition in 1493, and was sent by Ovando to conquer the island of Porto Rico. Having there amassed great wealth, and received information of an island situated to the north, he discovered the country, to which he gave the name of Florida. Ponce returned to Spain in 1513, and was appointed by Ferdinand governor of the island of Florida, as he called it, on condition that he should colonize it. In 1521 he embarked nearly all his wealth in two ships, and proceeded to take possession of his province. He was, however, met with determined hostility by the natives, who made a sudden attack upon the Spaniards and drove them to their ships. In the combat Ponce de Leon was mortally wounded.



## Poncho

**Poncho** (pon'chō), a kind of cloak much worn by the South American Indians, and also by many of the Spanish inhabitants. It is a piece of thick woolen cloth of rectangular form, from 5 to 7 ft. long and 3 to 4 ft. broad, with a hole in the center for the head to pass through.

**Pondicherry**, a town, capital of the French East Indian settlement of the same name, on the east or Coromandel coast, 85 mi. south by west from Madras. Area 115 sq. mi.; pop. 140,945. The town stands on a sandy beach, and consists of two divisions separated by a canal. The "White Town," or European quarter, on the east, facing the sea, is very regularly laid out, with well-built houses. The "Black Town," or native quarter, on the west, consists of houses or huts of brick or earth, and a few pagodas. There is an iron pier, and railway communication with the South Indian system was opened in 1879.

**Pontchartrain** (pont-châr'trân), a lake of Louisiana, U. S., bordering on New Orleans, about 40 mi. long from east to west, and nearly 25 in breadth. It is from 12 to 14 ft. deep, and communicates with Lake Borgne on the east, with Lake Maurepas on the west, and by means of a canal with New Orleans on the south.

**Pontiac**, Oakland co., Mich., 26 mi. n. w. of Detroit. Railroads: Grand Trunk: D. G. H. & M.; and P. O. & N. Industries: large woolen mill, flour mills, wagon factory, foundries, pump and iron windmill works. It is the seat of the eastern Michigan insane asylum. Pop. 1900, 9,769.

**Pon'tifex**, among the ancient Romans a priest who served no particular divinity. The Roman pontifices formed the most illustrious among the great colleges of priests. Their institution was ascribed to Numa, and their number varied at different periods from four to sixteen. The *pontifex maximus*, or chief pontiff, held his office for life, and could not leave Italy.

**Poodle**, a small variety of dog covered with long, curling hair, and remarkable for its great intelligence and affection. The usual color is white, but black and blue, if good in other points, are highly valued.

**Poole**, WILLIAM FREDERICK (1821-1894), the compiler of the *Index*, was b. at Salem, Mass., and graduated at Yale in 1849. While there he was librarian of a literary society, and prepared an index (pp. 154) of periodical literature, of which a second edition (pp. 521) was published in 1853, and a third (pp. 1,469), with the assistance of the American and British Library Associations, in 1882. A supplement (pp. 496), by Poole and W. J. Fletcher, of Amherst, was issued in 1888; and a similar one was promised for every five years. From 1856 to 1869 he was librarian of the Boston Athenæum; afterward he was employed in organizing libraries in various parts of the country, as at Waterbury, Conn., the naval academy at Annapolis, at Cincinnati, and 1888 at Chicago (the Newberry Library).

**Poonah** (or Puna), a city and district of Hindustan, in the presidency of Bombay. It

## Pope

is about 119 mi. e. of Bombay by the Great Indian Peninsular Railway. The city is well built, and has the Deccan college for classics, mathematics, and philosophy, and a college of science with special training in civil engineering, also training college, female normal school, and other schools, public library, hospital, arsenal, barracks, etc. It was the capital of the Peishwa, or head of the Mahratta confederacy. It is a health resort, and for part of the year the seat of the Bombay government. Manufactures include gold and silver jewelry, small ornaments in brass, copper, and ivory, and silk and cotton fabrics. It is an important military station (the cantonments lying to the north of the town), and good roads connect it with Bombay, Ahmednagar, Sattarah, etc. Pop. 129,751.

**Pooree**, a town and district in the province of Orissa, India. The town is 250 mi. s.w. from Calcutta, and 595 mi. n. of Madras. It contains the shrine of Juggernaut, to whose worship crowds flock from every part of India. Pop. 22,695. The district has an area of 2,473 sq. mi., and a pop. of 888,487.

**Pope**.—The derivation of the word has not been definitely determined, but the accepted meaning of it is *father*. From the earliest ages of Christianity the term father has been reverently applied to ecclesiastics. The title of Pope is, however, restricted to the pontiff or head of the Catholic Church. The Emperor Phocas decreed that to the Roman pontiff exclusively belonged the distinction of universal bishop. St. Peter is regarded as the first of the pontiffs of the Roman Catholic Church. This position of preëminence is accorded to the Apostle Peter because of Christ's saying, "And I say to thee that thou art *Peter* (rock) and on this rock I will build my Church and the gates of hell shall not prevail against it." According to tradition, Peter planted a church at Rome and died there a martyr.

Leo I, surnamed the Great (440-61), aimed to establish in the East and West a system of Papal vicariates, through which the Roman jurisdiction could be enforced and the Roman forms of faith permanently maintained. In the West he succeeded in this, but in the East his success was only partial and temporary. In 451 the Council of Chalcedon accepted the creed formulated by Leo, stating fully and clearly the belief in the union of the divine and human natures of Christ in one person. The fact that in 452, armed with none but spiritual weapons, Leo went out to meet the terrible Attila, and actually induced him to leave Italy without attacking Rome, is a convincing proof of the faith of the Pope and the power of the Church at this time.

During the German occupation of Italy the relations of the Popes with the barbarian rulers were friendly and the Church continued to prosper. Under the Byzantine sovereignty the prestige of the Church seemed in danger of disappearing. But this calamity was averted by the invasion of the Lombards, who drove the Byzantine garrisons from the country. During the following centuries of change, con-



## Pope

fusion and ruin, the Christian Church alone retained its organization. Even the Lombards were in time converted to Christianity and the people who, until the overthrow of the Emperor, had been accustomed to depend upon Rome for guidance in temporal affairs now continued to look thither for spiritual control, and the Bishop of Rome was acknowledged throughout Western Europe as the Head of the Church. Thus for centuries the Papacy gained strength, the Christian fathers, Augustine, Gregory the Great and a host of other active men, shaping its doctrines and policy. In 754 Pepin I, the Frankish king, expelled the Lombards from their recent conquests and guaranteed to the Papacy the temporal sovereignty of a stretch of territory including Rome and a considerable surrounding country. (See *Papal States*.) In the year 800, Pope Leo III crowned Pepin's son Charlemagne Holy Roman Emperor, thus restoring the Western Empire. Many causes now combined to extend the power of the Church. During the political strifes of the Dark Ages the Church afforded a refuge to the oppressed. In the convents and monasteries alone did learning flourish. Priests were therefore the teachers, secretaries and ambassadors of kings.

Gradually the bishops acquired the right to try all cases relating to marriage, trusts, perjury, simony or concerning widows, orphans or Crusaders, and even criminal cases. Thus by the end of the twelfth century the Church had absorbed not only the whole legislative power over the clergy but in part over the laity also. Consequently, the principle was established that all cases might be appealed from the courts of the bishops and archbishops of the different European countries to the Papal See. The Pope thus came to be regarded as the fountain of justice and the supreme judge of Christendom, while emperors and kings bore the sword simply as his ministers to carry into effect his sentences and decrees.

In the tenth century, when Otto the Great assumed the title of Holy Roman Emperor, there began between the Pope and the Emperor a contest for supremacy which lasted many centuries. During this time all Christendom was virtually divided into two parties, the members of which were respectively supporters of the Imperial or the Papal claims. The Crusaders greatly strengthened the Papal power, as the prominent part which the Popes took in them naturally fostered their authority by placing in their hands the armies and resources of Christendom and accustoming the people to look to them as guides and leaders.

Pope Gregory VII, or Hildebrand, carried on two important reforms, the enforcement of celibacy among the secular clergy and the suppression of simony. The principal instruments relied upon by Gregory for the carrying out of these reforms were Excommunication and Interdict. Thus he did much toward establishing the universal spiritual and temporal sovereignty of the Holy See. In the thirteenth century the Papal power gained a signal triumph over the Imperial party by its victory

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over the house of Hohenstaufen. In the period which follows, the authority of the Popes was at its height. Under Pope Innocent III (1198-1216) almost all the kings and princes of Europe swore fealty to the Pope as their overlord.

One of the severest blows given both the temporal and the spiritual authority of the Popes was the removal in 1309 of the Papal chair from Rome to Avignon, France. During the seventy years or so while it remained there all the Popes were French and, their policies being shaped according to French ideas, the Papacy ceased to possess that sacred cosmopolitan character which had hitherto characterized it. The Catholic world was not again united under a spiritual head until the election of Martin V in 1417. But the temporal rulers of France, Germany and England, taking advantage of the disturbed condition of the Papal See, successively revolted and freed themselves from the authority of the Papacy as touching political or governmental affairs. They continued, however, to recognize the Pope as the Head of the Church and the rightful arbiter in all spiritual matters. In the sixteenth century the Popes took such a prominent part in the political movements of Europe that their territory and jurisdiction were greatly extended. During this century, the opposition which had been slowly gathering in the North culminated in the Protestant Reformation, which directly challenged the traditional supremacy of the Papacy. The answer of the Church was clearly set forth in the decrees of the Council of Trent (1543-1553), which reaffirmed in unmistakable terms the beliefs of the Church of Rome.

At the close of the eighteenth century and in the nineteenth, changes took place in Europe which closely affected the Papal power. In 1797 the Pope was obliged to cede several of the States of the Church to Napoleon. A year later the remaining Papal States were erected into a Roman Republic, but in 1801 the Papal power was partly restored over them. In 1808-9 they were incorporated in the French Empire, but were again restored by the aid of the Austrians in 1815. When Pius IX ascended the Papal throne in 1846 his chief aim was to bring about a confederation of the Italian States under the Papal supremacy. With this object in view he placed himself at the head of the movement for reform, reorganized the municipal government of Rome and granted a constitution to the Papal States. In 1848 Pius was forced to flee to Gaeta, while Rome was proclaimed a republic. In 1850 he was restored to his rightful place by the aid of the French. In 1860 a large part of his dominions was annexed by Victor Emmanuel and in 1870 the remnant of the Papal States voted for union with the Kingdom of Italy, depriving the Pope of dominions. In accordance with the conviction of Roman Catholics generally, that it is not fitting that the Head of the Church be subject to any temporal ruler, the Pope has since 1870 remained in the Vatican, where his jurisdiction is still supreme. In spiritual mat-

# Pope

ters the Papal authority has, however, never been stronger than at the opening of the twentieth century, and even in temporal affairs the Papal influence continues to make itself felt through the Pope's viceregents in every land.

By the decrees of the Vatican Council of 1870 the pope has supreme power in matters of discipline and faith over all and each of the pastors and of the faithful. It is further taught by the Vatican Council that when the pontiff speaks *ex cathedra*, that is, when he, in virtue of his apostolic office, defines a doctrine of faith and morals to be held by the whole church, he possesses infallibility by divine assistance. The pope cannot annul the constitution of the church as ordained by Christ. He may condemn or prohibit books, alter the rites of the church, and reserve to himself the canonization of saints. A pope has no power to nominate his successor, election being entirely in the hands of the cardinals, who are not bound to choose one of their own body. The papal insignia are the tiara or triple crown, the straight crosier, and the pallium. He is addressed as "Your Holiness."

We subjoin a table of the popes, according to the Roman Notizie, with the dates of the commencement of their pontificates. The names printed in italics are those of anti-popes.

St. Peter.....	A. D. 42	St. Celestine I.....	422
St. Linus.....	66	St. Sixtus III.....	432
St. Anacletus.....	78	St. Leo I, the Great.....	440
St. Clement I.....	91	St. Hilary.....	461
St. Evaristus.....	100	St. Simplicius.....	468
St. Alexander I.....	108	St. Felix III.....	483
St. Sixtus I.....	119	St. Gelasius II.....	492
St. Telesphorus.....	127	St. Anastasius I.....	496
St. Hyginus.....	139	St. Symmachus.....	498
St. Pius I.....	142	St. Hormisdas— <i>Lau-</i>	514
St. Anicetus.....	157	<i>rence</i> .....	523
St. Soterus.....	168	St. John I.....	528
St. Eleutherius.....	177	St. Felix IV.....	530
St. Victor I.....	183	Boniface II— <i>Diosco-</i>	530
St. Zephyrinus.....	202	<i>rus</i> .....	533
St. Callixtus I.....	217	John II.....	535
St. Urban I.....	223	St. Agapetus I.....	536
St. Pontianus.....	230	St. Sylvester.....	537
St. Anterus.....	235	Vigilius.....	555
St. Fabian.....	236	John III.....	560
St. Cornelius.....	250	Benedict (I) Bonosus.....	574
St. Lucius I— <i>Novati-</i>	252	Pelagius II.....	578
<i>anus</i> .....	253	St. Gregory I, the	590
St. Stephen I.....	257	Great.....	590
St. Sixtus II.....	259	Sabinianus.....	604
St. Dionysius.....	269	Boniface III.....	607
St. Felix I.....	275	St. Boniface IV.....	608
St. Eutychianus.....	283	St. Deusdedit.....	615
St. Calixtus.....	290	Boniface V.....	619
St. Marcellinus.....	296	Honorius I.....	625
(See vacant 3 years		(See vacant 1 year	
and 6 months.)		and 7 months.)	
St. Marcellus I.....	308	Severinus.....	640
St. Eusebius.....	310	John IV.....	640
St. Melchisedes or Mil-		Theodorus I.....	642
tiades.....	311	St. Martin I.....	649
St. Sylvester I.....	314	St. Eugenius I.....	654
St. Marcus.....	316	St. Vitalianus.....	657
St. Julius I.....	337	Adeotatus.....	672
Liberius.....	352	Donus or Domnus I.....	676
St. Felix II (sometimes		St. Agathon.....	678
reckoned an anti-		St. Leo II.....	682
pope).....	355	St. Benedict II.....	684
St. Damasus I.....	366	John V.....	685
St. Siricius.....	384	Conon— <i>Theodorus</i> ;	686
St. Anastasius I.....	402	<i>Paschal</i> .....	687
St. Innocent I.....	417	St. Sergius I.....	687
St. Zosimus.....	417	John VI.....	701
St. Boniface I— <i>Eula-</i>		John VII.....	705
<i>ius</i> .....	418		

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Sisinnius.....	708	Gelasius II— <i>Gregory</i>	1118
Constantine.....	708	<i>VIII</i> .....	1119
St. Gregory II.....	715	Callixtus II.....	1119
St. Gregory III.....	731	Honorius II— <i>Celestine</i>	1124
St. Zachary.....	741	<i>II</i> .....	1124
Stephen II (died be-		Innocent II— <i>Anacle-</i>	1130
fore consecration).....	752	<i>tus II; Victor IV</i> .....	1130
Stephen III.....	752	Celestinus II.....	1143
St. Paul I— <i>Constan-</i>		Lucius II.....	1144
<i>tine; Theophylactus</i> ;	757	Eugenius II.....	1145
<i>Philp</i> .....	757	Anastasius IV.....	1153
Stephen IV.....	768	Adrian IV (Nicholas	1154
Adrian I.....	772	Breakspear, an Eng-	1154
St. Leo III.....	795	lishman).....	1154
Stephen V.....	816	Alexander III— <i>Victor</i>	1159
St. Paschal I.....	817	<i>V; Paschal III; Cal-</i>	1159
Eugenius II.....	824	<i>ixtus III; Innocent</i>	1159
Valentinus.....	827	<i>III</i> .....	1159
Gregory IV.....	827	Lucius III.....	1181
Sergius II.....	844	Urban III.....	1185
St. Leo IV.....	847	Gregory VIII.....	1187
Benedict III— <i>Anasta-</i>		Clement III.....	1187
<i>sius</i> .....	858	Celestinus III.....	1191
St. Nicholas I.....	867	Innocent III.....	1198
Adrian II.....	872	Honorius III.....	1216
John VIII.....	882	Gregory IX.....	1227
Marinus I, or Martin		Celestinus IV.....	1241
II.....	882	(See vacant 1 year	
Adrian III.....	884	and 7 months.)	
Stephen VI.....	885	Innocent IV.....	1243
Formosus.....	891	Alexander IV.....	1254
Boniface VI (reigned		Urban IV.....	1261
only 18 days).....	896	Clement IV.....	1265
Stephen VII.....	896	(See vacant 2 years	
Romanus.....	897	and 9 months.)	
Theodorus II— <i>Sergius</i>		Gregory X.....	1271
<i>III</i> .....	898	Innocent V.....	1276
John IX.....	898	Adrian V.....	1276
Benedict IV.....	900	John XIX or XX or	1276
Leo V.....	903	XXI.....	1276
Christopher.....	903	Nicholas III.....	1277
Sergius III.....	904	Martin IV.....	1281
Anastasius III.....	911	Honorius IV.....	1285
Lando.....	913	Nicholas IV.....	1288
John X.....	914	(See vacant 2 years	
Leo VI.....	920	and 3 months.)	
Stephen VIII.....	920	St. Celestinus V.....	1294
John XI.....	931	Boniface VIII.....	1294
Leo VII.....	936	Benedict XI.....	1303
Stephen IX.....	939	Clement V (papacy re-	1305
Marinus II, or Martin		moved to Avignon).....	1305
III.....	943	(See vacant 2 years	
Agapetus II.....	946	and 3 months.)	
John XII— <i>Leo VIII</i> .....	956	John XXII.....	1316
Benedict V.....	964	Benedict XII— <i>Nicho-</i>	1316
John XIII.....	965	<i>las V at Rome</i> .....	1334
Benedict VI.....	972	Clement VI.....	1342
Donus or Domnus II.....	974	Innocent VI.....	1352
Benedict VII.....	975	Urban V— <i>Clement VII</i> .....	1362
John XIV— <i>Boniface</i>		Gregory XI (throne	
<i>VII</i> .....	983	restored to Rome).....	1370
John XV.....	985	Urban VI.....	1378
Gregory V— <i>John XVI</i>		Boniface IX— <i>Benedict</i>	
<i>Sylvester II</i> .....	996	<i>XIII at Avignon</i> .....	1389
John XVI or XVII.....	1003	Innocent VII.....	1404
John XVII or XVIII.....	1003	Gregory XII.....	1406
Sergius IV.....	1009	Alexander V.....	1409
Benedict VIII— <i>Greg-</i>		John XXIII.....	1410
<i>ory VI</i> .....	1012	Martin V— <i>Clement</i>	
John XVIII or XIX.....	1024	<i>VIII</i> .....	1417
Benedict IX (deposed)		Eugenius IV— <i>Felix V</i> .....	1431
<i>John XX</i> .....	1033	Nicholas V.....	1447
Gregory VI— <i>Sylvester</i>		Callixtus III.....	1455
<i>III</i> .....	1045	Pius II.....	1458
Clement II.....	1046	Paul II.....	1464
Damasus II— <i>Benedict</i>		Sixtus IV.....	1471
<i>IX</i> attempts to re-		Innocent VIII.....	1484
sume the throne.....	1048	Alexander VI.....	1492
St. Leo IX.....	1049	Pius III.....	1503
Victor I.....	1055	Julius II.....	1503
Stephen X.....	1057	Leo X.....	1513
Benedict X.....	1058	Adrian VI.....	1522
Nicholas II.....	1058	Clement VII.....	1523
Alexander II— <i>Hono-</i>		Paul III.....	1534
<i>rtius II</i> .....	1061	Julius III.....	1550
Gregory VII (Hilde-		Marcellus II.....	1555
brand)— <i>Clement III</i> .....	1073	Paul IV.....	1555
(See vacant 1 year.)		Pius IV.....	1559
Victor III.....	1086	St. Pius V.....	1566
Urban II.....	1088	Gregory XIII.....	1572
Paschal II.....	1099	Sixtus V.....	1585

## Pope

Urban VII.....	1590	Clement XI.....	1700
Gregory XIV.....	1590	Innocent XIII.....	1721
Innocent IX.....	1591	Benedict XIII.....	1724
Clement VIII.....	1592	Clement XII.....	1730
Leo XI.....	1605	Benedict XIV.....	1740
Paul V.....	1605	Clement XIII.....	1750
Gregory XV.....	1621	Clement XIV.....	1769
Urban VIII.....	1623	Plus VI.....	1775
Innocent X.....	1644	Plus VII.....	1800
Alexander VII.....	1655	Leo XII.....	1825
Clement IX.....	1667	Plus VIII.....	1829
Clement X.....	1670	Gregory XVI.....	1831
Innocent XI.....	1676	Plus IX.....	1846
Alexander VIII.....	1689	Leo XIII.....	1878
Innocent XII.....	1691	Plus X.....	1904

**Pope, ALEXANDER (1688-1744)**, a celebrated English poet. His education was a desultory one. He picked up the rudiments of Greek and Latin from the family priest, and was successively sent to two schools, one at Twyford, the other in London. Before he was fifteen he attempted an epic poem, and at the age of sixteen his *Pastorals* procured him the notice of several eminent persons. In 1711 he published his poem the *Essay on Criticism*, which was followed by *The Rape of the Lock*, a polished and witty narrative poem founded on an incident of fashionable life. His next publications were *The Temple of Fame*, a modernization and adaptation of Chaucer's *House of Fame*; *Windsor Forest*, a pastoral poem; and *The Epistle of Elloisa to Abelard*. From 1713 to 1726 he was engaged on a poetical translation of Homer's works, the *Iliad* being wholly from his pen, the *Odyssey* only half. In 1728 he published his *Dunciad*, a mock heroic poem intended to overwhelm his antagonists with ridicule. This was followed by *Imitations of Horace*, and by *Moral Epistles or Essays*. His *Essay on Man* was published anonymously in 1733, and completed, and avowed by the author in the next year. In 1742 he added a fourth book to his *Dunciad*, in which he attacked Colley Cibber, then poet laureate. He d. and was interred at Twickenham. Pl. 35, Vol. IV.

**Poplar**, a well known genus of hardy deciduous trees, with both barren and fertile flowers in catkins, stamens four to thirty, leaves alternate, broad, with long and slender footstalks flattened vertically, the leaves having generally more or less of a tremulous motion. About eighteen species have been observed, natives of Europe, Central and Northern Asia, and North America. Some of the poplars are the most rapid growers of all hardy forest trees. They thrive under a variety of conditions as regards soil, etc., but do best in damp situations. The timber of the poplar is white, light, and soft, and not very valuable.

**Popocatepetl**, an active volcano in Mexico, in the province of Puebla. Its height has been estimated at 17,884 ft. The crater is 3 mi. in circumference, and 1,000 ft. deep, and contains vast quantities of the purest native sulphur, which until comparatively recently has not been commercially valuable. The mountain was first ascended in 1522. Forests cover the base of the mountain, but its summit is mostly covered with snow.

**Poppy**, the common name for plants bearing large, brilliant, but fugacious flowers. The white poppy yields the well known opium of

## Population

commerce. Most of the species are natives of Europe. They often occur as weeds in fields and waste places, and are frequently also cultivated in gardens for ornament. The seeds of the white poppy yield a fixed, harmless oil, employed for culinary purposes; and the oil-



Opium Poppy. a.—whole plant; b.—flower and leaf; c.—ripe capsule; d.—seed and section of ditto enlarged.

cake is used for feeding cattle. The roots of the poppy are annual or perennial; the calyx is composed of two leaves, and the corolla of four petals; the stamens are numerous, and the capsule is one celled, with several longitudinal partitions, and contains a multitude of seeds.

**Population.**—The power of propagation inherent in all organic life may be regarded as infinite. There is no one species of vegetable or animal which under favorable conditions as to space, climate, and food (that is to say, if not crowded and interfered with by others), would not in a small number of years overspread every region of the globe. To this property of organized being the human species forms no exception. And it is a very low estimate of its power of increase if we only assume that, under favorable conditions, each generation might be double the number of the generation which preceded it. Taking mankind in the mass, the individual desire to contribute to the increase of the species may be held to be universal, but the actual growth of population is nowhere left to the unaided force of this motive, and nowhere does any community increase to the extent of its theoretical capacity, even though the growth of population has come to be commonly considered as an indispensable sign of the prosperity of a community. For one thing population cannot continue to increase beyond the means of subsistence, and every increase beyond actual or immediately attainable means, must lead to a destruction of life. But if population is



## Porcupine

thus actually limited by the means of subsistence, it cannot be prevented by these means from going further than these means will warrant; that is to say, it will only be checked or arrested after it has exceeded the means of subsistence. It becomes then an inquiry of great importance by what kind of checks population is actually brought up to the point at which it is in fact arrested. This inquiry was at first systematically treated in an *Essay on the Principle of Population* published in 1798 by the Rev. T. R. Malthus. Malthus points out that population increases in a geometrical, while the means of subsistence only increase in an arithmetical, ratio. And in examining the bearing on each other of the different ratios of increase of human life, and of the means of supporting it, he has deduced a law to the proof of which a considerable portion of his work is devoted. This law is that the energy of reproduction rises above all the ordinary accidents of human life, and the inevitable restraints imposed by the various organizations of human society, so that in all the various countries and climates in which men have lived, and under all the constitutions by which they have been governed, the normal tendency of population has always been to press continuously upon the means of subsistence. Malthus divides the checks on the increase of population into two classes, preventive and positive; the one consisting of those causes which prevent possible births from taking place, the other of those which, by abbreviating life, cut off actual excesses of population. In a further analysis of these checks he reduces them to three—vice, misery, and moral restraint. The proof of his main position is historical and statistical. In regard to the subsidiary inquiry, the most striking point brought out is the rarity of moral restraint and the uniform action, in innumerable forms, of vice and misery. In order that the latter should be weakened in their action, and the former strengthened, it is desirable to have the general standard of living in a community raised as high as possible, and that all may look to the attainment of a position of comfort by the exercise of prudence and energy.

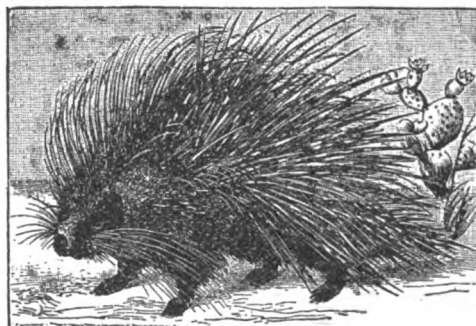
The population of the world at the beginning of the twentieth century is not far from a billion and a half. The latest estimates give the following density of population:

	Area in thousands of sq. mi.	Pop. in millions.	Persons per sq. mi.
Europe.....	3,742	373	99.66
Asia.....	17,101	831	48.57
Africa.....	11,510	170	14.77
America.....	14,805	133	8.96
Australasia.....	3,457	6	1.73
Polar Regions.....	1,732	.082	0.05

**Por'cupine**, a name of certain rodent quadrupeds. The body is covered, especially on the back, with the so-called *quills*, or dense, solid, spine-like structures, intermixed with bristles and stiff hairs. There are two incisors and eight molar teeth in each jaw, which

## Pork

continue to grow throughout life from permanent pulps. The muzzle is generally short and pointed, the ears short and rounded. The anterior feet possess four, and the hinder feet five toes, all provided with strong thick nails. The common or crested porcupine, found in Southern Europe and in Northern Africa, is the best known species. When fully grown it measures nearly 2 ft. in length, and some of its spines exceed 1 ft. Its general color is a



Common Porcupine.

grizzled dusky black. The spines in their usual position lie nearly flat, with their points directed backward; but when the animal is excited they are capable of being raised. The quills are loosely inserted in the skin, and may, on being violently shaken, become detached—a circumstance which may probably have given rise to the purely fabulous statement that the animal possessed the power of actually ejecting its quills like arrows or darts at an enemy. These animals burrow during the day, and at night search for food, which consists chiefly of vegetable matter. Of the American species, the Canadian or North American porcupine is the best known. It is about 2 ft. long, and of slow and sluggish habits. The quills in this species are short, and are concealed among the fur. The ears are short, and hidden by the fur. The tail is comparatively short.

**Pogie**, a fish with an oblong body, scaly cheeks, and one dorsal fin, found off the coasts of the U. S. It is one of the most important food fishes, and attains a length of 18 in. and a weight of 4 lbs.

**Pork**, the flesh of swine, is one of the most important and widely used species of animal food. Pork is coarser and ranker than beef or mutton, but when of good quality and well cured it develops a richness and delicacy of flavor in marked contrast with the dryness and insipidity of other salted meat. The abundance and digestive quality of its fat renders it suitable diet for cold climates. The swine was forbidden to be eaten by the Mosaic law, and is regarded by the Jews as especially typical of the unclean animals. Other Eastern nations had similar opinions as to the use of pork. Pork contains less fibrine, albuminous and gelatinous matter than beef or mutton.

**Porphyry**, originally the name given to a very hard stone, partaking of the nature of granite, susceptible of a fine polish, and consequently much used for sculpture. In the fine arts it is known as *Rosso Antiquo*, and by geologists as *Red Syenitic Porphyry*, with variegated shades. Egypt and the East furnish this material in abundance. It also abounds in Minorca, where it is of a red-lead color, variegated with black, white, and green. Pale and red porphyry, variegated with black, white, and green, is found in separate nodules in Germany, England, and Ireland. The art of cutting porphyry as practised by the ancients appears to be quite lost.

**Porphyry** (Porphyrios) (233-305), a Greek philosopher of the Neo-Platonic school, celebrated as an antagonist of Christianity. He studied under Longinus at Athens, and at the age of thirty placed himself under the teaching of Plotinus at Rome. About 268 he went to Sicily, where he is said to have written his treatise against the Christians, which was publicly burned by the Emperor Theodosius, and is only known from fragments in the authors who have refuted him. Porphyry recognized Christ as an eminent philosopher, but he charged the Christians with corrupting his doctrines. He was a voluminous writer, but few of his works are extant. The most important are his *Lives of Plotinus and Pythagoras*.

**Porpoise**, the smallest and most familiar of all Cetacea, occurs plentifully off the British coast and in the North Sea. It attains an average length of 5 ft. The front of the head is convex in form, and has the spiracle or blow-hole in the middle line. The eyes and ears are small. The caudal fin is horizontal and flattened. The neck is very short. The fore limbs project from the body. No hind limbs are developed. The teeth are small with blunted crowns. The stomach is in three portions. No olfactory nerves exist. The porpoise feeds almost entirely on herrings and other fish, and herds or "schools" of porpoises follow the herring shoals, among which they prove very destructive. An allied species is the round-headed porpoise, or "caaing whale" of the Shetlanders. These latter measure from 20 to 24 ft. in length, and are hunted for the sake of the oil.

**Port**, a harbor or haven, or place where ships receive and discharge cargo. A *free port* is one at which the goods imported are exempted from the payment of any customs or duties, as long as they are not conveyed into the interior of the country.

**Port**, the name given to the left side of a ship (looking toward the prow), as distinguished from the starboard or right side. Formerly *larboard* was used instead of *port*.

**Porta**. See *Baccio della Porta*.

**Portage**, Columbia co., Wis., on Wisconsin River, at head of navigation. Railroads: Wisconsin Central, and C. M. & St. P. Industries: hosiery and knitting mills, plow factory, foundry. Granite and jasper are found in the vicinity. Pop. 1900, 5,459.

**Port Arthur**, a strongly fortified seaport town at the S. extremity of Manchuria. The Japanese captured it in 1894, but a coalition between Russia, Germany and France forced its return to China, who leased it to Russia in 1898 for 25 years. At the outbreak of the Russo-Japanese war, it at once became the chief point of contest. After an eleven months' siege, one of the greatest of modern history, the Russians surrendered to Gen. Nogi on Jan. 1, 1905.

**Port-au-Prince** (por-tō-prans), capital of the Republic of Hayti, on the western side of the island, at the southeast extremity of the bay of the same name. It is built on a low and unhealthy spot, consists chiefly of wooden houses, and contains an ungainly palace, a senate house, a Roman Catholic church, a customhouse, mint, a hospital, lyceum, etc. The chief exports are mahogany and red-wood, coffee, and cocoanuts. Pop. 40,000.

**Port Chester**, Westchester co., N. Y., on Long Island Sound, 26 mi. n.e. of New York. Railroad, N. Y. N. H. & H. Industries: stoves, iron bolts, shirt factory, cotton mills, etc. Pop. 1900, 7,440.

**Porter**, DAVID DIXON (1813-1891), naval officer, was b. in Chester, Penn. He entered the U. S. navy as a midshipman in 1829. He served during the entire Mexican War, and was in every action on the coast. At the beginning of the Civil War he was placed in command of the steam frigate Powhatan. In command of a mortar fleet he rendered assistance in the reduction of forts Jackson and St. Philip; likewise in the capture of Vicksburg and Arkansas Post. For these services he was made rear admiral. In 1865 with General Terry captured Fort Fisher. In 1866 he was promoted to vice admiral, and in 1870 appointed admiral.

**Porter**, GENERAL FRITZ-JOHN (1822-1901); b. at Portsmouth, N. H., August 31, 1822. He was educated at West Point, and served through the Mexican and Civil Wars. He held the command of a corps in the Army of the Potomac and gained distinction in the battles of Gaines Mill and Malvern Hill. His command took part in the second battle of Bull Run, where he remained inactive the first day and was especially active the second day. This action caused him to be court-martialed and dismissed from the service. He was restored with the rank of colonel by an act of congress in 1886, and was retired at his own request. Later he engaged in business.

**Porter**, HORACE, soldier and diplomat, was b. in Pennsylvania in 1827. He was educated at the Lawrence Scientific School at Harvard and at West Point. He had just graduated from the military school when the war broke out. He entered the army and won distinction as a commander. In 1867 General Porter was made assistant secretary of war by Grant in Johnson's cabinet. In 1897 he was appointed ambassador to France by President McKinley.

**Porter**, JANE (1776-1850), was b. at Durham. Her publications include *Thaddeus of Warsaw* and *The Scottish Chiefs*. Died at Bristol.

**Porter**, NOAH, D. D. LL.D. (1811-1892), an

## Port Hope

American philosopher and writer, b. at Farmington, Conn. Graduating at Yale College in 1831, he was ordained pastor of the Congregational church, New Milford, Conn., in 1836, and in 1843 settled at Springfield, Mass. Returning to Yale in 1846 as professor of metaphysics and moral philosophy, he was elected president in 1871, and continued to hold that position till 1886. Among his chief works are *Historical Discourses*, *The Human Intellect*, *Books and Reading*, *The Science of Nature Versus the Science of Man*, *The Elements of Intellectual Philosophy*, *The Elements of Moral Science*, *Bishop George Berkeley*, and *Kant's Ethics*. Dr. Porter also edited an edition of Webster's Dictionary.

**Port Hope**, a town of Canada on the northern shore of Lake Ontario, 63 mi. n.e. of Toronto by the Grand Trunk Railway. The town is beautifully situated on the lake. It has a good trade in timber, grain and flower. Pop. 5,042.

**Port Huron**, co. seat of St. Clair co., Mich.; port of entry, on the St. Clair and Black rivers, at the foot of Lake Huron, and on the Grand Trunk & Pere Marquette railroads; is connected with Sarnia, Canada, by a steam ferry and a tunnel. It has a large grain, lumber and wool trade. The locomotive shops of the Grand Trunk R. R. are located here. Among many handsome buildings is the U. S. government building, costing \$250,000. Pop. 1900, 19,158.

**Portico**, in architecture, a kind of porch before the entrance of a building fronted with columns, and either projecting in front of the building or receding within it. Porticoes are styled tetrastyle, hexastyle, octostyle, decastyle, according as the columns number four, six, eight, or ten.

**Port Jervis**, Orange co., N. Y., on Delaware River and Delaware and Hudson canal, 88 mi. n.w. of New York. Railroads: Erie & Port Jervis; Monticello & New York. Industries: iron foundry, railroad shops, and various other industries including glass works and boot and shoe factories. Pop. 1900, 9,385.

**Portland**, Cumberland co., Me., on an arm of Casco Bay, 103 mi. n.e. of Boston. Railroads: Boston & Maine; Maine Central; Portland & Rochester; Grand Trunk; and Portland & Rumford Falls. Industries: wire screens, several iron foundries and farm-implement factories, furniture, canned goods, box, leather, clothing, and match factories. Surrounding country agricultural. The town was first settled in 1622 and became a city in 1832. Pop. 1900, 50,145.

**Portland**, Multnomah co., Oregon, on Willamette River. Railroads: Union Pacific; Northern Pacific; and Oregon & Colorado. Industries: iron and woolen mills, flour, lumber, paper, furniture, carriages, paints, oils, pottery, cement and lime works. It is the trade center of Oregon, Washington, and Idaho, and has a large export trade in grain, fruit, flour, and lumber. The medical department of Willamette and the law department of the University of Oregon are located here. Pop. 1900, 90,426.

**Portland**, a town of New Brunswick, really a

## Porto Rico

suburb of St. John City, with which it has been recently united. Pop. 15,226.

**Portland Beds**, in geology a division of the Upper Oolites occurring between the Purbeck Beds and the Kimmeridge Clay, consisting of beds of hard oolitic limestone and freestone interstratified with clays and resting on light-colored sands which contain fossils, chiefly mollusca and fish, with a few reptiles. They are named from the rocks of the group forming the Isle of Portland in Dorsetshire from whence they may be traced through Wiltshire as far as Oxfordshire.

**Portland Cement**. See *Cement*.

**Porto Rico**, one of the islands of the West Indies, the fourth in size of the Antilles, east of Hayti; area, with subordinate isles, 3,606 sq. mi. The island is beautiful and very fertile. A range of mountains, covered with wood, traverses it from east to west, averaging about 1,500 ft. in height, but with one peak 3,678 ft. high. In the interior are extensive savannahs; and along the coast tracts of fertile land, from 5 to 10 mi. wide. The streams are numerous, and some of the rivers can be ascended by ships to the foot of the mountains. There are numerous bays and creeks. The chief harbor is that of the capital, San Juan de Porto Rico; others are Mayaguez, Ponce, and Arecibo. The climate is rather healthy except during the rainy season (September to March). Gold is found in the mountain streams. Copper, iron, lead, and coal have also been found; and there are salines or salt ponds. The chief products are sugar, rum, molasses, coffee, cotton, tobacco, hides, live-stock, dye woods, timber, rice, etc. The island was discovered by Columbus in 1493, and was settled by the Spaniards in 1510. The island was ceded by Spain to the U. S. at the close of the Spanish-American war in 1898.

**Population**. (United States Census, October, 1899).—According to the census taken under the direction of the United States War department, the population is 953,243. The growth in population is shown by the following table:

<i>Census of</i>	<i>Population</i>
1860 .....	583,308
1877 .....	731,648
1887 .....	798,565
1897 .....	899,439
1899 .....	953,243

Porto Rico has 264 persons to a square mile, the density of population being twice that of New York State. The area, population, and density of population of the seven departments are as follows:—

<i>Department.</i>	<i>Area.</i>	<i>Pop. 1899.</i>	<i>Persons to sq. mi.</i>
Guayama.....	561	111,986	200
Humacao.....	413	88,501	214
Ponce.....	822	203,191	247
Arecibo.....	621	162,308	261
Bayamon.....	542	160,046	295
Mayaguez.....	407	127,566	313
Aguadilla.....	240	99,645	415
<b>Total.....</b>	<b>3,606</b>	<b>953,243</b>	<b>264</b>



## Porto Rico

*Cities and Towns.*—There are no large cities in the island; San Juan, the largest, has a population of 32,048; Ponce, 27,952; Mayaguez, 15,187; Arecibo, 8,008. There are fifty-seven cities of 1,000 inhabitants or more.

Following is a list of the cities of over 5,000 inhabitants:—

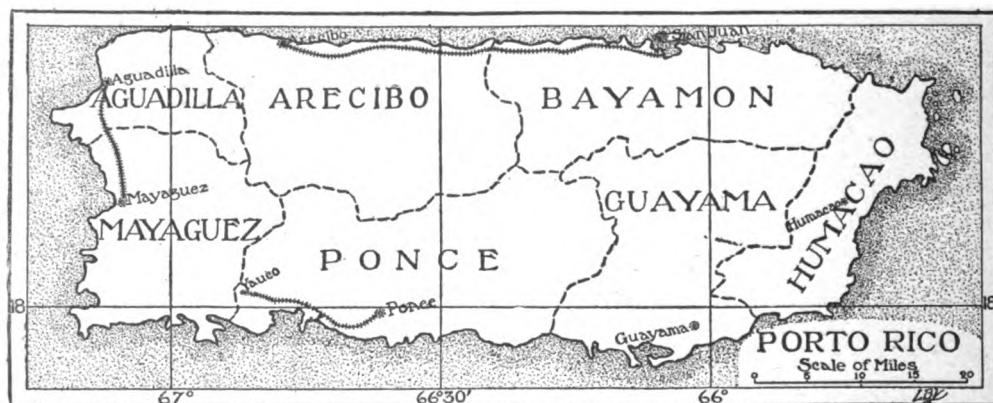
<i>Cities</i>	<i>Population</i>
Aguadilla.....	6,425
Arecibo.....	8,008
Caguas.....	5,450
Guayama.....	5,334
Mayaguez.....	15,187
Ponce.....	27,952
San Juan.....	32,048
Yauco.....	6,108

Of the total population of 953,243, there are 8,721 more males than females.

The population under ten years of age is 31 per cent of the total.

## Porto Rico

Over eighty-three per cent of the population, according to the report of General Davis, could not read or write in 1899. The misfortunes, too, of flood and famine, which have occurred since the American occupation, have in themselves been such a check to enterprise of any kind as to forbid expectation of progress in education. Nevertheless, a decided change has taken place. With the conviction that the common school is a safeguard of the people, the military governor, General Henry, recommended the organization of the school system of the island, the need of which was recognized by representative Porto Ricans, who had already drawn up resolutions requiring the establishment of kindergartens and normal schools, and asking other changes after the pattern of schools in the United States. General John Eaton, formerly Commissioner of Education, was appointed by Señor Salvador Carbonell, secretary of the interior, December 31, 1898, to take charge of the work,



There are in the island 59,390 negroes, 304,352 persons of mixed blood, and 75 Chinese, making a total colored population of 363,817, or 38.2 per cent of the total.

The native born population constitutes 98.5 per cent of the total, and 69.7 per cent are single.

The number of children of school age, 5 to 17, is 322,393. Of these only 8.1 per cent attended school in 1899.

There are 659,294 persons over 10 years of age, of whom 509,498, or 77.3 per cent, can not read. There are 15,380 who can read but can not write. The number of those who have superior education is given as 5,045. The number of males of voting age is 201,071. Of these 47,973 only could read.

*Education.*—The following facts regarding the status of education in Porto Rico are drawn from the report of the United States Commissioner of Education for the fiscal year ending June 30, 1900.

The former condition of the people of Porto Rico seems to have been unfavorable to popular education. Poverty bred apathy, and the antecedents of the greater part of the people, from an intellectual standpoint, were unfortunate.

and he continued in office as chief of the bureau of education of Porto Rico until May, 1900. He was then succeeded in his duties by Dr. Victor S. Clark, who has presented a very full report on education in Porto Rico to Hon. Geo. W. Davis, military commander.

In many respects the common-school system was in an unsatisfactory condition. There were no schoolhouses which had been especially built for the purpose, and suitable school furniture and materials were wanting, while the school was often kept in the dwelling of the teacher, who frequently carried on some other occupation while performing his function of teacher. This condition was recognized and deplored by the Spanish inspectors in 1880, who reported upon the illiteracy of the population, the incompetence of the teachers, their ignorance of methods, the want of school accommodations, furniture, text-books, maps, blackboards, etc. The cause of this state of things was to be found in the political and social condition of the island, and is explained in the interesting history of education in Porto Rico under the Spanish rule by Señor Enrique C. Hernandez, secretary of the insular board of education, contained in Dr. Clark's report.

## Porto Rico

From that history we see that the Porto Ricans always had more or less education for the wealthy class, but that primary education had been neglected (as it was in the mother country and many other countries in Europe) until 1820, notwithstanding the laudable efforts of municipalities and individuals to establish schools. The conditions of the island practically forbade schools.

An order was issued on May 1, 1899, by the military governor, which reorganized the system of education. An insular board of education consisting of five members was created July 3, 1899, which was to act in an advisory or superintending capacity. The president of this board was the insular superintendent of education. By the act of Congress of April 12, 1900, the charge of public instruction is placed under a commissioner of education, who shall make such report as may be required by the Commissioner of Education of the United States. The order of 1899 divided the island into school districts something like those in the United States, provided English supervisorships, prescribed the manner of electing local school boards, established fines for nonattendance to duty on the part of the boards, and provided for district school taxes and for the issuance of district bonds. The municipalities were required to provide buildings or quarters for the schools, the schools were graded, the courses of study prescribed, and the qualifications of the teachers were defined, and their salaries fixed, free text-books were provided for, and high schools, a normal school, and professional schools were organized.

At the close of the school year, June, 1899, there were 212 town schools, 313 county districts with schools, and 426 without schools. In a population of 857,660 there were 152,961 boys and 144,851 girls of school age, of whom only 19,804 boys and 9,368 girls were enrolled in the schools, a total of 29,172, while the attendance was 21,873, leaving 268,630 children without school facilities. There were 582 teachers in 1898-99, 74 of whom were from the United States. The salaries ranged from \$30 to \$75 dollars per month in gold. The municipal expenditure for schools in 1898-99 was \$203,372.90, and the total expenditure \$279,216. The insular appropriation for schools for 1899-1900 was \$330,050. In the first term, 1899-1900, the enrollment was 15,440 boys, 8,952 girls, total 24,392. Average daily attendance, 20,103. Population of the island, 957,779. The board of education offered an annual appropriation of \$20,000 for any town in the island which would provide a like amount for site and buildings for an industrial and normal school. This offer was accepted by the town of Fajardo.

*Civil Government Established.*—On the first of May, 1900, the government of Porto Rico was transferred from the military to the civil authorities constituted under the act of Congress approved April 12, 1900. In his annual report for 1900 the Secretary of War makes the following comment upon the conduct of the affairs of the island under a military governor:—

## Porto Rico

"After all the disorder, lawlessness, and distress consequent upon a state of war, the withdrawal of accustomed control, the transfer of sovereignty to a people unfamiliar with the language, the customs, and prejudices of the island, the long delay in the legislation establishing civil and political rights and business relations, the poverty, ruin, and suffering caused by the great hurricane, the military governor was able to say, at the close of his administration:—

"On April 30 the machinery of civil government was in charge of experienced public officers, and the organization, with departments, bureaus, and other branches, both insular and municipal, was such that the new government ordered by congress to be instituted could the following day be launched and carried forward in an efficient and economic manner. The courts of the island were all in the discharge of their proper functions. The dockets were not crowded as they were a year before. The prisons and jails were well kept, and were not overflowing. The public highways were in fine condition and were being rapidly extended. The amount that could be spared from the treasury for education was being applied in such a manner as to give instruction according to modern methods to over 30,000 children. The laws of taxation had been so changed that very heavy and onerous burdens had been removed from the poor. In office in every municipality were officers who in every instance were the choice of the electors, thus granting to municipalities almost complete autonomy. Life and property were everywhere secure, and this without the use of troops for protection. Notwithstanding the most grievous losses suffered by the people from raids of banditti, from arson, from disturbance of trade relations, from losses of Spanish markets without corresponding gains elsewhere, from unsettled conditions resulting from the use of a currency which suffered a heavy discount when referred to a gold basis, and, finally, from the almost overwhelming disaster of August of last year, when seven-tenths of all the maturing crops were blotted out of existence—notwithstanding all these obstacles and burdens, the military governor was able to turn over to the civil governor the comfortable balance in the insular treasury of over \$300,000."

The distribution of supplies to the sufferers from the hurricane continued up to July 15, 1900. In all, 30,000,000 pounds of food, costing \$831,480.16, were distributed by a board of charities, of which the chief surgeon of the military department was president, and in which the entire organization of the army in the department was utilized. To as great an extent as practicable the owners of the coffee plantations were utilized in the distribution of rations, and the able-bodied men receiving them were required, in return for rations, to engage in the work of recovering the plantations from the destruction wrought by the hurricane, in order that as soon as possible the production of coffee in the island might be revived. In addition to the supplies co-

## Porto Rico

tributed by the public, the central Porto Rican relief committee received contributions of money amounting to \$81,090.58. Of this amount, over \$46,000 was used in the purchase of food, medical and hospital supplies, and clothing; the expenses of the committee amounted to over \$2,000; and the balance was used to aid in the establishment and maintenance of an asylum for the care of orphan children whose parents had lost their lives in, or in consequence of, the hurricane. For the purpose of furnishing further relief, by giving employment instead of alms, and at the same time securing much-needed means of communication, an expenditure of \$200,000 was authorized in October, 1899, and the further expenditure of \$750,000 was authorized in February and May, for the construction of military roads.

The law which provided for civil government in Porto Rico made the following general provisions: The capital is San Juan, and the seat of government is to be maintained there; the official title of the chief executive officer shall be, "The governor of Porto Rico." He shall be appointed by the President, by and with the consent of the senate; he shall hold his office for a term of four years, unless sooner removed by the President; he has all the powers of the governors of the territories of the United States that are not locally inapplicable; he is also required to make official reports at least annually, as to the condition of affairs in the island. The other executive officers provided for are a secretary, an attorney-general, a treasurer, an auditor, a commissioner of the interior, and a commissioner of education.

The legislative branch of the government comprises two bodies — one being the executive committee appointed by the president, made up of the secretary, attorney-general, treasurer, auditor, and the commissioners of the interior and education, with five other persons of good repute (five of the eleven being native inhabitants), who hold office for four years. The other house consists of thirty-five delegates elected biennially by the qualified voters. These two houses have much the same power as legislatures in the territories. Courts of various kinds are also provided for. The salary of the governor is \$8,000 per year.

The island is to have "a resident commissioner" in the United States, who is to be elected at the general elections. The law specifies that he "shall be entitled to official recognition by all departments upon presentation to the department of state of a certificate of election of the governor of Porto Rico." The salary of the commissioner is fixed at \$5,000 per annum, to be paid by the United States. "No person shall be eligible to such election who is not a bona-fide citizen of Porto Rico, who is not thirty years of age, and who does not read and write the English language."

President McKinley appointed as governor Hon. Charles H. Allen, of Massachusetts; treasurer, J. H. Hollander; auditor, John R. Garrison. Governor Allen resigned and was succeeded by Hon. Wm. H. Hunt, Sept. 1, 1901.

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The first general election was held November 6, 1900, and the total vote cast was 58,515. Of this number, all but 148 votes were cast for Señor Degetau, the Republican candidate. The Federal candidate was Señor Gutell. The total registration for this election was a little less than 120,000. It was reported that the Federals formally withdrew before the election, claiming that they had suffered injustice in the registration. This would account for the great disparity in the vote for the two candidates. Members for the lower legislative body were also elected. Governor Allen reported that the election was quiet and orderly.

*The Porto Rican Tariff.*—When Porto Rico passed into the possession of the United States, her free trade with Spain was cut off, and the tariff laws of the United States prevented free trade with this country. Then, too, no goods could be brought into Porto Rico except that they paid the tariff rates existing in the United States. This proved to be a most serious drawback to the island, and in his message to congress December 5, 1899, President McKinley recommended that the markets of the United States be opened up to Porto Rican products. He said: "Our plain duty is to abolish all customs tariffs between the United States and Porto Rico and give her products free access to our markets." Bills were introduced into both branches of congress early in January, providing for free trade with Porto Rico. Gov-

During the month of January, however, the sentiment of the majority seems to have changed; it was stated that the bills were prompted by a misunderstanding, and that revenues in excess of the amount to be raised by local taxation were needed for the support of the island. It was then proposed that the rate of tariff be reduced to 25 per cent of the Dingley tariff rates. The question of the status of Porto Rico as a part of the United States then came up, and the Ways and Means committee of the house, as a necessary preliminary to the consideration of a tariff law for Porto Rico, declared that the constitution and laws of the United States do not extend over Porto Rico and the other island possessions. A bill was then presented imposing a tariff equal to 25 per cent of the existing United States tariff. The debate on this bill was sharp, and continued in the house until February 28, when upon the call for amendments, Mr. Payne of New York offered an amendment making the rate of duty on imports from Porto Rico 15 per cent of the rates provided by the Dingley law, instead of 25 per cent as provided by the pending bill. This amendment was adopted without division. Mr. Payne then proposed an additional section to the bill, as follows: "This act shall be taken and held to be provisional in its purposes and intending to meet a pressing need for revenue for the island of Porto Rico, and shall not continue in force after March 1, 1902." This section was adopted. The bill was put upon its final passage April 11, and was carried by a vote of 172 to 160—not voting, 21. In the senate the tariff bill was attached to the Foraker bill,



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providing for a civil government in Porto Rico. Early in 1901 a fair and equitable tax law was enacted by the Porto Rican legislature. In July the legislature informed the President of the United States that suitable tax laws were in successful operation, and that the revenue derived from customs was no longer needed. They requested that the tariff be withdrawn on July 25th. From that date Porto Rico has enjoyed free trade with this country.

*Status of the Island.*—As noted before, the discussion of the tariff brought up the question of the relation of our new possessions to the United States. The majority held that the term "United States" means the States constituting the Federal Union, but does not cover the territory belonging to the United States; also the power of congress with respect to legislation for the territories is plenary. The minority position was that the term "United States" designates the whole or any particular portion of the American empire. Of course this was a matter which would require the decision of the supreme court of the United States to settle finally. Two classes of cases were brought before the court, one denying the right of the U. S. to collect customs duties after the treaty of Paris was signed, and the other denying the right to collect duties under the Foraker act. In the first instance the supreme court on May 27, 1901, decided against the government on the ground that as soon as the treaty of Paris was signed, Porto Rico ceased to be "foreign territory," and therefore our customs duties on imports from foreign countries could not be levied upon goods brought from Porto Rico. In the second case the government was sustained. The court held "that Porto Rico is a territory appurtenant to and belonging to the United States, but not a part of the United States, within the revenue clause of the constitution; that the Foraker act is constitutional so far as it imposes duties upon imports from such island." This decision plainly gives to congress plenary powers to govern the island as may seem best.

**Port Royal**, a fortified town on the s.e. coast of Jamaica, on a tongue of land, forming the south side of the harbor of Kingston. Its harbor is a station for British ships of war, and it contains the naval arsenal, hospital, etc. It has been often damaged by earthquakes. Pop. 14,000.

**Portsmouth**, Rockingham co., N. H., on Piscataqua River. Railroads: Boston & Maine, and C. & M. Industries: cotton mills, shoe shops, and shipyards. It has a fine harbor, and large coastwise and foreign commerce. A U. S. navy yard is situated here. Pop. 1900, 10,637.

**Portsmouth**, Norfolk co., Va., on Elizabeth River, 1 mi. s.w. of Norfolk. Railroads: Seaboard & Roanoke, and Norfolk & Carolina. Steamers to Baltimore. Industries: Railroad shops and other manufactures. It exports large quantities of cotton, lumber, pig iron, naval stores, etc. A U. S. navy yard is situated near here. Pop. 1900, 17,427.

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**Portsmouth**, county seat of Scioto co., O., 100 m. s. of Columbus; at the junction of the Scioto and Ohio rivers; at the terminus of the Ohio and Erie Canal, and on the B. & O. Southwestern, the Norfolk & Western, and the Cinn., Ports. & Va. railroads. Portsmouth is in a rich agricultural and mineral region. It has a large trade by river and canal and is noted for its iron and steel works. Other industries are flour and lumber mills, shoe factories, distilleries, fire-brick plants, furniture and veneer works and foundries. It is the seat of the Ohio Military Academy. Pop. 1900, 17,870.

**Portugal**, a kingdom in the southwest of Europe, forming the west part of the Iberian Peninsula; bounded e. and n. by Spain, and w. and s. by the Atlantic; greatest length, north to south, 345 mi.; greatest breadth, 140 mi. It is divided into seven provinces: Minho, Trá-os-Montes, Beira, Estremadura, Alentejo, and Algarve, with a total area of 34,462 sq. mi., and a pop. of 4,306,554. Add to these the Azores (921 sq. mi.; pop. 269,401), and Madeira (315 sq. mi.; pop. 132,223), which gives a grand total of 35,698 sq. mi., and a pop. of 4,708,178. The colonial possessions of Portugal consist of—in Asia—Goa, Salsette, Damaun, and Diu, all in Hindustan, Macao in China, and possessions in the Indian Archipelago, having together an area estimated at 7,923 sq. mi., and a pop. est. at 847,503; in Africa—Cape Verd, St. Thomas, and Prince's Islands, the Guinea settlements, Angola (Congo, Benguela, Mossamedes), Mozambique, and dependencies, with an aggregate of 697,335 sq. mi., and an est. pop. of 4,141,448. The total area of the Portuguese possessions therefore amounts to 909,824 sq. mi.; the pop. 5,518,000.

*Physical Features.*—Portugal is only partially separated from Spain by natural boundaries. Its shape is nearly that of a parallelogram. The coast line, of great length in proportion to the extent of the whole surface, runs from the north in a general s.w. direction till it reaches Cape St. Vincent, where it suddenly turns east. It is occasionally bold, and rises to a great height; but the far greater part is low and marshy, and not infrequently lined by sands and reefs, which make the navigation dangerous. The only harbors of importance, either from their excellence or the trade carried on at them, are those of Lisbon, Oporto, Setubal, Faro, Figueira, Aveiro, and Vianna. The interior is generally mountainous, a number of ranges stretching across the country, forming a succession of independent river basins, while their ramifications form the water-sheds of numerous subsidiary streams, and enclose many beautiful valleys. The loftiest range is the Serra do Estrella, a continuation of the central chain stretching across Spain, which attains the height of 7,524 ft. The nucleus of the mountains is usually granite, especially in the north and middle. The minerals include lead, iron, copper, manganese, cobalt, bismuth, antimony, marble, slate, salt, salt-peter, lithographic stones, millstones, and porcelain earth.

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*Climate and Productions.*—The climate is greatly modified by the proximity of the sea and the height of the mountains. In general the winter is short and mild, and in some places never completely interrupts the course of vegetation. Early in February vegetation is in full vigor; during the month of July the heat is often extreme, and the country assumes, particularly in its lower levels, a very parched appearance. The drought generally continues into September; then the rains begin, and a second spring unfolds. Winter begins at the end of November. In the mountainous districts the loftier summits obtain a covering of snow, which they retain for months; but south of the Douro, and at a moderate elevation, snow does not lie long. The mean annual temperature of Lisbon is about 56°. Few countries have a more varied flora than Portugal. The number of species has been estimated to exceed 4,000, and of these more than 3,000 are phanerogamous. Many of the mountains are clothed with forest trees, among which the common oak and the cork oak are conspicuous. In the central provinces chestnuts are prevalent; in the south both the date and the American aloe are found; while in the warmer districts the orange, lemon, and olive are cultivated with success. The mulberry affords food for the silkworm, and a good deal of excellent silk is produced. The vine, too, is cultivated, and large quantities of wine are sent to Britain (especially port wine), and also to France, being in the latter country converted into Bordeaux wine. Agriculture generally, however, is at a low ebb, and in ordinary years Portugal fails to raise cereals sufficient to meet its own consumption. Among domestic animals raised are mules of a superior breed, sheep, goats, and hogs; but up to a very few years ago little attention was paid to their improvement. In consequence of recent reforms, however, there has been a marked improvement in most branches of industry. More horned cattle have been raised and of a better quality, and live stock now figures with timber and wine among the chief exports. The fisheries, so long neglected, have also been revived in recent years.

*Manufactures, Industry, etc.*—Manufactures are of limited amount, although they have been increasing of late years. They embrace woollens, cottons, silks, earthenware and porcelain, soap, paper, iron goods, hats, etc. The principal exports are wine, cork, cattle, timber, olive oil, fruits, iron and copper pyrites, and wool; the principal imports are cereals, salt provisions, colonial produce, woollen, cotton, linen, and silk tissues, iron, steel, and other metals, and coal. The bulk of the trade is with Great Britain, France, and Brazil. The French metric system of weights and measures was introduced into Portugal between 1860 and 1863.

*Government, etc.*—The crown is hereditary both in the male and female line. The constitution recognizes four powers in the state—the legislative, executive, judicial, and moderating. The last is vested in the sovereign.

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There are two chambers, the Chamber of Peers and the Chamber of Deputies. In 1885 a law was passed abolishing hereditary peerages by a gradual process. All laws relating to the army and taxation must originate in the Chamber of Deputies. While the established religion is the Roman Catholic, other religions are tolerated. Conventual establishments were suppressed in 1834. Education, under a distinct ministry, is compulsory; but the law is not enforced, and the general state of education is low. The army, consisting of 30,000 men on the peace footing, is raised both by conscription and enlistment. The navy numbers thirty-five steamers with 136 guns, thirteen sailing vessels, and a customs gunboat, and three training ships.

*History.*—The Phœnicians, Carthaginians, and Greeks early traded to this part of the peninsula, the original inhabitants of which are spoken of as Lusitanians, the country being called Lusitania. It was afterward conquered by the Romans, who introduced into it their own civilization. The country was afterward inundated by Alans, Suevi, Goths, and Vandals, and in the eighth century (712) was conquered by the Saracens. When the Spaniards finally wrested the country between the Minho and the Douro from Moorish hands, they placed counts or governors over this region. Henry the Younger of Burgundy, grandson of Hugh Capet, came into Spain about 1090, to seek his fortune in the wars against the Moors. Alphonso VI gave him the hand of his daughter, and appointed him (1095) count and governor of the provinces Entre Douro e Minho, Traz-os-Montes, part of Beira, etc. The count, who owed feudal services to the Castilian kings, was permitted to hold in his own right whatever conquests he should make from the Moors beyond the Tagus (1112). Henry's son, Alphonso I, defeated Alphonso, king of Castile, in 1137, and made himself independent. In 1139 he gained the brilliant victory of Ourique over the Moors, and was saluted on the field King of Portugal. The cortes convened by Alphonso in 1143 at Lamego confirmed him in the royal title, and in 1181 gave to the kingdom a code of laws and a constitution. Alphonso extended his dominions to the borders of Algarve, and took Santarem in 1143. The capture of Lisbon (1147) which was effected by the aid of some English Crusaders and others, was one of the most brilliant events of his warlike life. The succeeding reigns from Alphonso I to Dionysius (1279) are noteworthy chiefly for the conquest of Algarve (1251) and a conflict with the pope, who several times put the kingdom under interdict. Dionysius's wise encouragement of commerce, agriculture, manufacturers, and navigation laid the foundation of the future greatness of Portugal. He liberally patronized learning, and founded a university at Lisbon, transferred in 1308 to Coimbra. By these and other acts of a wise and beneficent administration he earned the title of *father of his country*. He was succeeded by Alphonso IV, who in conjunction with Alphonso II of

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Castile defeated the Moors at Salado in 1340. He murdered Inez de Castro, the wife of his son Pedro (1355) (see *Inez de Castro*), who succeeded him. Dying in 1367, Pedro I was succeeded by Ferdinand, on whose death in 1383 the male line of the Burgundian princes became extinct. His daughter Beatrice, wife of the King of Castile, should have succeeded him, but the Portuguese were so averse to a connection with Castile that John I, natural son of Pedro, grand-master of the order of Avis (founded in 1162), was saluted king by the estates. In 1415 he took Ceuta, on the African coast, the first of a series of enterprises which resulted in those great expeditions of discovery on which the renown of Portugal rests. In this reign were founded the first Portuguese colonies, Porto Santo (1418), Madeira (1420), the Azores (1433), and those on the Gold Coast. The reigns of his son Edward (1433-38) and his grandson Alphonso V were less brilliant than that of John I; but the latter was surpassed by that of John II (1481-95), perhaps the ablest of Portugal rulers. In his reign began a violent struggle with the nobility whose power had become very great under his indulgent predecessors. The expeditions of discovery were continued with ardor and scientific method. Bartolommeo Diaz doubled the Cape of Good Hope in 1487, and Vasco da Gama reached India in 1498. In 1500 Cabral took possession of Brazil.

While these great events were still in progress John II was succeeded by his cousin Emanuel (1495-1521). The conquests of Albuquerque and Almeida made him master of numerous possessions in the islands and mainland of India, and in 1518 Lope de Soares opened a commerce with China. Emanuel ruled from Babelmandeb to the Straits of Malacca, and the power of Portugal had now reached its height. In the reign of John III, son of Emanuel (1521-57), Indian discoveries and commerce were still further extended; but the rapid accumulation of wealth through the importation of the precious metals, and the monopoly of the commerce between Europe and India, proved disadvantageous to home industry. The wisdom which had hitherto so largely guided the counsels of the kings of Portugal now seemed to forsake them. The Inquisition was introduced (1536), and the Jesuits were admitted (1540). Sebastian, the grandson of John III, who had introduced the Jesuits, having had his mind inflamed by them against the Moors of Africa, lost his life in the battle against these infidels (1578), and left his throne to the disputes of rival candidates, of whom the most powerful, Philip II of Spain, obtained possession of the kingdom by the victory of Alcantara. The Spanish yoke was grievous to the Portuguese, and many efforts were made to break it; but the power of Philip was too great to be shaken. Portugal continued under the dominion of Spain till 1640, and her vast colonial possessions were united to the already splendid acquisitions of her rival. But these now began to fall into the hands of the Dutch, who, being provoked by

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hostile measures of Philip, attacked the Portuguese as well as the Spanish possessions both in India and America. They deprived the Portuguese of the Moluccas, of their settlements in Guinea, of Malacca, and of Ceylon. They also acquired about half of Brazil, which, after the re-establishment of Portuguese independence, they restored for a pecuniary compensation. In 1640, by a successful revolt of the nobles, Portugal recovered her independence, and John IV, duke of Braganza, reigned till 1656, when he was succeeded by Alphonso VI. Alphonso ceded Tangier and Bombay to England as the dowry of his daughter, who became the queen of Charles II, Pedro II, who deposed Alphonso VI, concluded a treaty with Spain (1668), by which the independence of the country was acknowledged.

During the long reign of John V (1706-50) some vigor was exerted in regard to foreign relations, while under his son and successor Joseph I (1750-77) the Marquis of Pombal, a vigorous reformer such as Portugal required, administered the government. On the accession of Maria Francisca Isabella, eldest daughter of Joseph, in 1777, the power was in the hands of an ignorant nobility and a not less ignorant clergy. In 1792, on account of the sickness of the queen, Juan Maria José, prince of Brazil (the title of the prince royal until 1816), was declared regent. His connections with England involved him in war with Napoleon; Portugal was occupied by a French force under Junot, and the royal family fled to Brazil. In 1808 a British force was landed under Wellington, and after some hard fighting the decisive battle of Vimeira took place (August 21), which was followed by the Convention of Cintra and the evacuation of the country by the French. The French soon returned, however; but the operations of Wellington, and in particular the strength of his position within the lines of Torres Vedras, forced them to retire. The Portuguese now took an active part in the war for Spanish independence. On the death of Maria in 1816, John VI ascended the throne of Portugal and Brazil, in which latter country he still continued to reside. The absence of the court was viewed with dislike by the nation, and the general feeling required some fundamental changes in the government. A revolution in favor of constitutional government was effected without bloodshed in 1820, and the king invited to return home, which he now did. In 1822 Brazil threw off the yoke of Portugal, and proclaimed Dom Pedro, son of John VI, emperor. John VI d. in 1826, having named the Infanta Isabella Maria regent. She governed in the name of the emperor of Brazil, Dom Pedro IV of Portugal, who granted a new constitution, modeled on the French, in 1826. In this year he abdicated the Portuguese throne in favor of his daughter Maria da Gloria, imposing on her the condition of marrying her uncle Dom Miguel, who was intrusted with the government as regent; but the absolutist party in Portugal set up the claim of Dom Miguel to an unlimited sovereignty, and a



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revolution in his favor placed him on the throne in 1828. In 1831 Dom Pedro resigned the Brazilian crown, and returning to Europe succeeded in overthrowing Dom Miguel, and restoring the crown to Maria in 1833, dying himself in 1834. In 1836 a successful revolution took place in favor of the restoration of the constitution of 1820, and in 1842 another in favor of that of 1826. Maria d. in 1853. Her husband, Ferdinand of Saxe-Coburg (Dom Ferdinand II), became regent for his and her son, Pedro V, who himself took the reins of government in 1855. Pedro d. in 1861, and was succeeded by his brother, Louis I. Louis d. in 1889, and was succeeded by his son, Carlos I. During these latter reigns the state of Portugal has generally been fairly prosperous and progressive. The relations between Britain and Portugal have generally been very friendly, but Portuguese encroachments on territory under British protection in South-east Africa provoked an emphatic protest from Britain in 1889-90, and a rupture was even threatened for a time.

*Language and Literature.*—The differences between Portuguese and Spanish languages are of comparatively modern origin, the two languages being very nearly alike in the time of Alphonso I. The dialect of Spanish spoken in Portugal at the beginning of the monarchy was the Galician, which was also that of the court of Leon; but that court subsequently adopted the Castilian, which became the dominant language of Spain. The decline of the Galician dialect in Spain, and the formation of the Portuguese language, finally determined the separation of Spanish and Portuguese, and from cognate dialects, made them distinct languages. Portuguese is considered to have less dignity than the Spanish, but is superior to it in flexibility. In some points of pronunciation it more resembles French than Spanish. It is also the language of Brazil. The oldest monuments of Portuguese literature do not go back further than the twelfth and thirteenth centuries, and the native literature could then boast of nothing more than popular songs. The first Portuguese collection of poetry was made by King Dionysius, and was published under the title of *Cancioneiro del Rey Dom Diniz*. Some poems on the death of his wife are attributed to Pedro I, husband of Inez de Castro. The sons and grandsons of John I were poets and patrons of the troubadours. *Sã de Miranda* marks the transition from the fifteenth to the sixteenth century, and the separation of the Portuguese from the other Spanish dialects, and from the language of the troubadours. The sixteenth century is the classic era of Portuguese literature. The chief names are *Sã de Miranda*, Antonio Ferreira, Camoens, Diego Bernardes, Andrade Caminha, and Alvares do Oriente. The principal epic and the greatest poem in the Portuguese literature, almost the only one which has acquired a European reputation, is *Os Lusíadas* (the Portuguese) of Camoens (1524-80), which has placed its writer in the rank of the few great poets of the highest class whose genius is universally recognized. After

## Poseidōn

Camoens as an epic writer, comes Cortereal, who has celebrated the siege of Diù, and the shipwreck of Sepulveda. Vasco de Lobeiro, Francisco Moraes, and Bernardim Ribeiro, are among the leading romance writers. The drama also began to be cultivated in the sixteenth century. *Sã de Miranda* studied and imitated Plautus. Ferreira composed the first regular tragedy, *Inez de Castro*. Camoens wrote several theatrical pieces, among which are *Amphitryon* and *Seleucus*. Barros, also a romance writer, wrote a *History of the Conquest of India*. The *Commentaries of Alphonso d'Albuquerque*, by a nephew of the conqueror; the *Chronicle of King Manuel and of Prince John*, by Damian de Goes; the *History of the Discovery and Conquest of the Indies*, by Lopes de Castanheda; the *Chronicle of King Sebastian*, by Diego Bernardo Cruz, are all works of merit. By the opening of the seventeenth century Portugal's literary greatness had been succeeded by one of great activity, though of little real power. A crowd of epics were stimulated into being by the success of the *Lusiad*. During this period the native drama became almost extinct, being overshadowed by the Spanish. In the eighteenth century the influence of the French writers of the age of Louis XIV so completely dominated Portuguese literature that it became almost entirely imitative. Toward the close of this century two writers appeared who have formed schools, Francisco Manoel do Nascimento (1734-1829), an elegant lyrist, and Barbosa du Bocage, who introduced an affected and hyperbolic style of writing. Among more recent poets possessing some claim to originality may be mentioned Mouzinho de Albuquerque, Feliciano Castilho, Herculanio de Carvalho, Almeida Garrett, and Thomas Ribeiro; among novelists are Carvalho, Garrett, Julio Diniz, and Rebello de Silva. Through the efforts of these and others Portuguese literature has again begun to assume an aspect of native vigor. In art, Portugal has never distinguished herself.

**Port Wine** is a very strong, full-flavored wine produced in the upper valley of the Douro, Portugal, and has its name from the place of shipment, Oporto. It is slightly astringent, and has a color varying from pink to red. It requires three or four years to mature, and with age becomes tawny; it receives a certain proportion of spirit to hasten the process of preparation. The vintage begins early in September and extends into October. The port wine trade was established in 1678. The total annual production is put at from 110,000 to 120,000 pipes, of which at present 40,000 are on an average exported. Since 1876 the vineyards of the Douro have suffered greatly from the phylloxera. Large quantities of artificial port are made in the U. S.

**Poseidōn** (po-si' dōn), the Greek god of the sea, identified by the Romans with the Italian deity Neptunus. A son of Kronos and Rhea, and hence a brother of Zeus, Hēra, and Dēmētēr, he was regarded as only inferior in power to Zeus. His usual residence was in the depths of the sea near Ægæ, in Eubœa, and the at-

tributes ascribed and most of the myths regarding him have reference to the phenomena of the sea. The horse, and more particularly the war horse, was sacred to Poseidōn, and one of the symbols of his power. During the Trojan War Poseidōn was the constant enemy of Troy, and after its close he is described as thwarting the return of Ulysses to his home for his having killed Polyphēmus, a son of the god. Poseidōn was married to Amphitritē. His worship was common throughout Greece and the Greek colonies, but especially prevailed in the maritime towns. The Isthmian games were held in his honor. In works of art Poseidōn is represented with features resembling those of Zeus, and often bears the trident in his right hand. A common representation of him is as drawn in his chariot over the surface of the sea by hippocamps (monsters like horses in front and fishes behind) or other fabulous animals.

**Posen**, a fortified town in Prussia, capital of the province of the same name and an archbishop's see, stands on the Warthe, 149 mi. e. by s. of Berlin. It is surrounded by two lines of forts, is built with considerable regularity, has generally fine wide streets, and numerous squares or open spaces. The most noteworthy public buildings are the cathedral, in the Gothic style (1775), the town parish church, a fine building in the Italian style, both Roman Catholic; the townhouse (1508), with a lofty tower; the Raczyński Library; the municipal archive building, etc. The manufactures consist chiefly of agricultural machines, manures, woolen and linen tissues, carriages, leather, lacquerware, etc. There are also breweries and distilleries. Pop. 68,315. The province is bounded by West Prussia, Russian Poland, Silesia, and Brandenburg; area 11,178 sq. mi. The surface is flat, and extensively occupied by lakes and marshes. A small portion on the northeast belongs to the basin of the Vistula, all the rest to the basin of the Oder. The soil is mostly of a light and sandy character, yielding grain, millet, flax, hemp, tobacco, and hops. Forests occupy 20 per cent. of the surface. The inhabitants include many Germans especially in the towns, but considerably more than half are Poles. Posen being one of the acquisitions which Prussia made by the dismemberment of Poland. It is divided into the governments of Posen and Bromberg. Pop. 1,715,618.

**Positive Philosophy** (or Positivism) is the name given by Auguste Comte to the philosophical and religious system promulgated by him. The distinguishing idea which lies at the root of this twofold system is the conception that the anomalies of our social system cannot be reformed until the theories upon which it is shaped have been brought into complete harmony with science. The leading ideas of Comte's philosophy are 1, the classification of the sciences in the order of their development, proceeding from the simpler to the more complex—mathematics, astronomy, physics, chemistry, biology, and sociology; and 2, the doctrine of the "three stages," or

the three aspects in which the human mind successively views the world of phenomena, namely, the theological, the metaphysical, and the scientific. This theory of the three stages, one of the most characteristic of Comte's system, is thus stated by George Henry Lewes:—

"Every branch of knowledge passes successively through three stages: 1, the *supernatural* or fictitious; 2, the *metaphysical* or abstract; 3, the *positive* or scientific. The first is the necessary point of departure taken by human intelligence; the second is merely a stage of transition from the supernatural to the positive; and the third is the fixed and definite condition in which knowledge is alone capable of progressive development. In the *supernatural* stage the mind seeks after *causes*; aspires to know the *essences* of things and their modes of operation. It regards all effects as the productions of supernatural agents, whose intervention is the *cause* of all the apparent anomalies and irregularities. Nature is animated by superhuman beings. Every unusual phenomenon is a sign of the pleasure or displeasure of some being adored and propitiated as a god. In the metaphysical stage, which is only a modification of the former, but which is important as a transitional stage, the supernatural agents give place to abstract forces (personified abstractions) supposed to inhere in the various substances, and capable themselves of engendering phenomena. The highest condition of this stage is when all these forces are brought under one general force named nature. In the positive stage the mind, convinced of the futility of all inquiry into causes and essences, applies itself to the observation and classification of laws which regulate effects; that is to say, the invariable relations of succession and similitude which all things bear to each other. The highest condition of this stage would be to be able to represent all phenomena as the various particulars of one general view."

The religious side of positivism has somewhat the nature of an apology or after-thought. After doing away with theology and metaphysics, and reposing his system on science or positive knowledge alone, Comte discovered that there was something positive in man's craving for a being to worship. He therefore had recourse to what he calls the cultus of humanity considered as a corporate being in the past, present, and future, which is spoken of as the *Grand Être*. This religion, like other forms of worship, requires for its full development an organized priesthood, temples, etc. Under the régime of positive religion Comte would include the political and social side of his system. Hence some of his followers look forward to the establishment of an international republic, composed of the five great Western nations of Europe, destined ultimately to lead the whole world. Society in this great commonwealth will be reorganized on the basis of a double direction or control, that of the temporal or material authority, and that of the spiritual or educating body.

Among leading thinkers of the last genera-

## Posse Comitatus

tion Comte's adherents included such intellects as George Henry Lewes, John Stuart Mill, Richard Congreve, Harriet Martineau, and others. Later investigators, however, have not sustained the favorable verdict of those who judged from a nearer mental perspective. The critiques of Herbert Spencer, Professor Huxley, John Fiske, and Dr. McCosh are especially important; also the reply of M. Littré, the foremost French disciple of Comte, to Mill's elaborate critique of positivism.

**Pos'se Comita'tus**, in law, "the power of the county," that is, the citizens who are summoned to assist an officer in suppressing a riot or executing any legal process.

**Postmaster General**, the chief officer of the Post Office Department of the executive branch of the government of the U. S. His duties are to establish post offices and appoint postmasters, and, generally, to superintend the business of the department in all the duties assigned to it.

**Post Office**, a department of the government of a country charged with the conveyance of letters, newspapers, parcels, etc. From the time of Cyrus the Elder down to the Middle Ages various rulers had concocted more or less effective systems of postal communication throughout their dominions; but the "post" as we know it to-day is an institution of very modern growth. The beginnings of a postal service in the U. S. date from 1639, when a house in Boston was employed for the receipt and delivery of letters for or from beyond the seas. In 1672 the government of New York colony established "a post to goe monthly from New York to Boston;" in 1702 it was changed to a fortnightly one. A general post office was established and erected in Virginia in 1692, and in Philadelphia in 1693. A deputy postmaster general for America was appointed in 1692; and by act of Parliament in 1710 he was directed to keep his principal office in New York, "and other chief offices in some convenient place or places in other of Her Majesty's provinces or colonies in America;" a monopoly was established which included also the transport of travelers, and a tariff was fixed. The system, however, proved a failure, until 1753, when Benjamin Franklin became postmaster general; when he was removed from office in 1774 the net revenue exceeded \$15,000.

In 1789, when the post office was transferred to the new federal government, the number of offices in the thirteen states was only about seventy-five. A conspectus of the remarkable progress in the ensuing century is supplied in the table below. Outstanding events in the history of the American postal service have been the negotiation of a postal treaty with England (1846); the introduction of postage stamps (1847); of stamped envelopes (1852), of the system of registering letters (1855); the establishment of the free delivery system, and of the traveling post office system (1863); the introduction of the money order system (1864), of postal cards (1873), and, between the last two dates, of stamped newspaper wrappers, and of envelopes bearing re-

## Post-tertiary

quests for the return of the enclosed letter to the writer in case of non-delivery; the formation of the Universal Postal Union (1873); the issue of "postal notes" payable to bearer (1883); and the establishment of a special delivery system (1885), under which letters bearing an extra ten cent stamp are delivered by special messengers immediately on arrival. The postmaster general is a member of the cabinet. Under him about 100,000 persons are employed, of whom some 76,000 are postmasters. Most of these, except letter-carriers and clerks, are liable to be removed on the accession to federal office of a new political party. The following table shows the increase, by decades, during the department's history, in offices, length of mail routes in miles, revenue, etc.:—

Years.	Offices.	Miles.	Revenue.	Expenditure.
1790.....	75	1,875	\$37,935	\$32,140
1800.....	903	20,817	280,804	213,994
1810.....	2,300	36,406	552,366	485,969
1820.....	4,500	72,492	1,111,927	1,160,826
1830.....	8,450	115,176	1,850,583	1,932,708
1840.....	13,468	155,739	4,543,522	4,718,236
1850.....	18,417	178,672	5,552,071	5,217,953
1860.....	28,498	240,954	8,518,067	19,170,610
1870.....	38,492	231,232	19,772,221	23,998,837
1880.....	42,989	343,888	33,315,479	36,542,804
1890.....	62,401	..	60,858,783	66,645,083
1900.....	76,688	500,982	102,354,579	107,740,268

As will be seen, the U. S. post office department is carried on at a loss; this is due to the large amount of postal matter of certain classes carried at less than the cost of conveyance and distribution.

The number of post offices in the U. S. is larger than in any other country. It provides a post office to every 1,003 persons. All mail matter is divided into four classes. The first class includes letters, postal cards, and anything closed against inspection: postage, 2 cents each oz. or additional fraction of an oz.; postal cards, 1 cent; registered letters, 10 cents in addition to postage. Second class matter includes all newspapers, periodicals, etc., issued as frequently as four times a year: postage, 1 cent per lb. or fraction thereof. When the newspapers, etc., are sent by persons other than the publishers, the charge is 1 cent for each four oz. Mail matter of the third class includes books, circulars, proof sheets, etc.: postage, 1 cent for each 2 ozs.; limit of weight, 4 lbs. each package. The fourth class embraces merchandise and all matters not included in the other three classes: postage 1 cent per oz.; limit of weight, 4 lbs. Prepayment of postage by stamps for all classes of matter is required.

Larceny in relation to the post office is punished with great severity. Every person employed under the post office who wrongfully opens or detains a letter, or is accessory thereto, is liable to be punished by fine or imprisonment, or both. If he embezzle, secrete, or destroy a letter, he is guilty of felony, and is liable to penal servitude.

**Post-tertiary**, in geology, the Lyellian term for all deposits and phenomena of more recent date than the Norwich or mammaliferous



## Postulate

crag. It may be restricted so as only to include accumulations and deposits formed since the close of the glacial or boulder drift systems, and has been divided into three sections—*historic*, *prehistoric*, and *post-glacial*. The first comprises the peat of Great Britain and Ireland, fens, marshes, river deposits, lake silts, accumulations of sand drift, etc., containing human remains, canoes, metal instruments, remains of domestic animals, etc. The *prehistoric* comprises similar, or nearly similar deposits, but the remains found in them are older, comprising stone implements, pile dwellings, and extinct animals, as the Irish deer, mammoth, etc. To the *post-glacial* belong raised beaches with shells of a more boreal character than those of existing seas, the shell-marl under peat, many dales and river valleys, as well as the common brick clay, etc., covering submarine forests or containing the remains of seals, whales, the mammoth, rhinoceros, urus, hyena, hippopotamus, etc.

**Postulate**, a position or supposition assumed without proof, being considered as self-evident, or too plain to require illustration. In geometry, the enunciation of a self-evident problem. Euclid has constructed his elements on the three following postulates: 1, Let it be granted that a straight line may be drawn from any one point to any other point; 2, That a terminated straight line may be produced to any length in a straight line; 3, That a circle may be described from any center at any distance from that center.

**Potash** (or Potassa), an alkaline substance obtained from the lye of vegetable ashes which is mixed with quicklime and boiled down in iron pots, and the residuum ignited, the substance remaining after ignition being common potash. It derives its name from the *ashes* and the *pots* (called potash kettles) in which the lixivium is (or used to be) boiled down. An old name was *vegetable alkali*. Potash in this crude state is an impure carbonate of potassium, which, when purified, is known in commerce as *pearlash*. It is used in the making of glass and soap, and large quantities of it are now produced from certain "potash minerals" (especially carnallite), instead of from wood ashes. What is known as *caustic potash* is prepared from ordinary potash. It is solid, white, and extremely caustic, *eating* into animal and vegetable tissues with great readiness. It changes the purple of violets to green, restores reddened litmus to blue, and yellow turmeric to reddish-brown. It rapidly attracts humidity from the air, and becomes semi-fluid. It is fusible at a heat of 300°, and is volatilized at low ignition.

**Potassium**, a name given to the metallic basis of potash, discovered by Davy in 1807, and one of the first fruits of his electro-chemical researches; symbol, K; atomic weight, 39.1. Next to lithium it is the lightest metallic substance known, its specific gravity being 0.865 at the temperature of 60°. At ordinary temperatures it may be cut with a knife and worked with the fingers. At 32° it is hard and

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brittle, with a crystalline texture; at 50° it becomes malleable, and in luster resembles polished silver; at 150° it is perfectly liquid. Potassium has a very powerful affinity for oxygen, which it takes from many other compounds. A freshly-exposed surface of potassium instantly becomes covered with a film of oxide. The metal must therefore be preserved under a liquid free from oxygen, rock-oil or naphtha being generally employed. It conducts electricity like the common metals. When thrown upon water it decomposes that liquid with evolution of hydrogen, which burns with a pale violet flame, owing to the presence in it of potash vapor. *Chloride* of potassium is known in commerce as "muriate of potash," and closely resembles common salt. It is obtained from potassic minerals, the ashes of marine plants and from sea water or brine springs. It enters into the manufacture of saltpeter, alum, artificial manures, etc.

**Potato**, a plant belonging to the natural order Solanaceae, which also includes such poisonous plants as nightshade, henbane, thorn-apple, and tobacco. We owe this esculent to western South America, where it still grows wild chiefly in the region of the Andes, producing small, tasteless, watery tubers. The potato was first introduced into Europe by the Spaniards after the conquest of Peru, by whom it was spread over the Netherlands, Burgundy, and Italy before the middle of the sixteenth century. In the course of the eighteenth century it became a favorite article of food with the poorer classes in Germany; but in France there existed so violent a prejudice against it that it did not come into general use until toward the end of the century. The potato is a perennial plant, with angular herbaceous stems, growing to the height of 2 or 3 ft.; leaves, pinnate; flowers pretty large, numerous, disposed in corymbs, and colored violet, bluish, reddish, or whitish. The fruit is globular, about the size of a gooseberry, reddish-brown or purplish when ripe, and contains numerous small seeds. The tubers, which furnish so large an amount of the food of mankind, are really underground shoots abnormally dilated, their increase in size having been greatly fostered by cultivation. Their true nature is proved by the existence of the "eyes" upon them. These are leaf buds, from which, if a tuber, or a portion of it containing an eye is put into earth, a young plant will sprout, the starchy matter of the tuber itself supplying nutriment until it throws out roots and leaves, and so attains an independent existence. The potato succeeds best in a light sandy loam containing a certain proportion of vegetable matter. The varieties are very numerous, differing in the time of ripening, in their form, size, color, and quality. New ones are readily procured by sowing the seeds, which will produce tubers the third year, and a full crop the fourth. But the plant is usually propagated by sowing or planting the tubers, and it is only in this way that any one variety can be kept in cultivation. Potatoes are extensively used as a cattle food, and starch is also manufac-

## Potemkin

tured from them. In Maine, Vermont, and Northern New York this is an important industry. Enormous crops of this valuable esculent are grown in the U. S.

**Potemkin** (pot-yom'kin), GREGORY ALEXANDROVITCH (1736-1791), Russian general, a favorite of the Empress Catharine II. He gained the entire confidence of Catharine, and became her avowed favorite. From 1776 till his death, a period of more than fifteen years, he exercised a boundless sway over the destinies of the nation.

**Pot Metal**, an inferior kind of brass (copper, 10 parts; lead, 6 to 8), used for making various large vessels employed in the arts. Also a kind of stained glass in which the colors are incorporated with the substance by being added while the glass is in a state of fusion.

**Poto' mac**, a river which forms the boundary between Maryland and Virginia, passes Washington, and after a course of nearly 400 mi. flows into Chesapeake Bay, being about 8 mi. wide at its mouth. The termination of the tide water is at Washington, about 125 mi. from the sea, and the river is navigable for large ships all that distance. Above Washington are several falls which obstruct navigation.

**Potsdam**, a town in Prussia, capital of the province of Brandenburg, and the second royal residence of the kingdom, is charmingly situated in the midst of wooded hills, 17 mi. s. w. of Berlin, on the Havel, which here has several lakes connected with it. The principal edifices are the royal palace; Garrison Church; the Nikolai Church; the French Protestant Church; the townhouse; and the Barberini Palace. The palace of Sans Souci, a building of one story, was erected under direction of Frederick the Great; the grounds are finely laid out, and contain various fountains, etc., and an orangery 330 yards long. In the same neighborhood is the New Palace, a vast brick building exhibiting much gaudy magnificence. A third palace in the environs of the town is called the Marble Palace. Potsdam was an unimportant place till the Great Elector selected it as a place of residence and built the royal palace in the town (1660-71). Pop. 50,877.

**Pottery**, the art of forming vessels or utensils of any sort in clay. This art is of high antiquity, being practised among various races in prehistoric times. We find mention of earthenware in the Mosaic writings. The Greeks had important potteries at Samos, Athens, and Corinth, and attained great perfection as regards form and ornamentation. Demaratus, a Greek, the father of Tarquinius Priscus, king of Rome, is said to have instructed the Etruscans and Romans in this art. Glazed earthenware was long supposed to be of no older date than the ninth century of our era, and to have originated with the Arabs in Spain; but the discovery of glazed ware in Egypt, of glazed bricks in the ruins of Babylon, of enameled tiles and glazed coffins of earthenware in other ancient cities, proves that this is not the case. The Arabs, however, seem to be entitled to the credit of having introduced the manufacture of glazed ware into

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modern Europe. The Italians are said first to have become acquainted with this kind of ware as it was manufactured in the island of Majorca, and hence they gave it the name of *majolica*. They set up their first manufactory at Faenza in the fifteenth century. In Italy the art was improved, and a new kind of glaze was invented, probably by Luca della Robbia. The French derived their first knowledge of glazed ware from the Italian manufactory at Faenza, and on that account gave it the name of *faience*. About the middle of the sixteenth century the manufactory of Bernard Palissy at Saintes in France became famous on account of the beautiful glaze and rich ornaments by which its products were distinguished. A little later the Dutch began to manufacture at Delft the more solid but less beautiful ware which thence takes its name. The principal improver of the potter's art in Britain was Josiah Wedgwood in the last century. Porcelain or chinaware first became known in Europe about the end of the sixteenth century through the Dutch, who brought it from the East.

Though the various kinds of pottery and porcelain differ from each other in the details of their manufacture, yet there are certain general principles and processes which are common to them all. The first operations are connected with the preparation of the potter's paste, which consists of two different ingredients, an earthy substance, which is the clay proper; and a siliceous substance, which is necessary to increase the firmness of the ware, and render it less liable to shrink and crack on exposure to heat. The clay is first finely comminuted, and reduced to the consistency of cream, when it is run off through a set of wire, gauze, or silk sieves into cisterns, where it is diluted with water to a standard density. The other ingredient of the potter's material is usually ground flints, or flint powder, as it is called. The flint nodules are reduced to powder by being heated and then thrown into water to make them brittle. They are then passed through a stamping mill and ground to fine powder; which, treated in much the same way as the clay, is finally passed as a creamy liquor into a separate cistern. These liquors are now mixed in such measure that the dry flint powder bears to the clay the proportion of one sixth or one fifth, or even more, according to the quality of the clay and the practise of the manufacturer. The mixture is then forced into presses, lined with cloth, by means of a force pump, the cloth retaining the clay and allowing the water to escape. The clay now forms a uniform inelastic mass, which is cut into cubical lumps and transferred to a damp cellar, where it remains until a process of fermentation or disintegration renders it finer in grain and not so apt to crack in the baking. But even after this process the ingredients composing the paste are not intimately enough incorporated together nor sufficiently fine in texture until another operation has been undergone, called *slapping* or *wedging*, which consists in repeatedly breaking the lumps across

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and striking them together again in another direction, dashing them on a board, etc. This final process of incorporation is now most frequently performed by machinery.

In making earthenware vessels, if they are of a circular form, the first operation after the paste has been made is turning, or what is technically called *throwing* them on the wheel. This is an apparatus resembling an ordinary turning lathe, except that the surface of the *chuck*, or support for the clay, is horizontal instead of vertical. The chuck is in fact a revolving circular table, in the center of which a piece of clay is placed, which the potter begins to shape with his hands. The rotary motion of the table gives the clay a cylindrical form in the hands of the potter, who gradually works it up to the intended shape. It is then detached from the revolving table and dried, after which, if intended for finely-finished ware, it is taken to a lathe and polished. It is at this stage that the handles and other prominent parts are fitted on, which is done by means of a thin paste of clay called *slip*. The articles are now removed to a room in which they are dried more thoroughly at a high temperature. When they have reached what is called the *green* state they are again taken to a lathe and more truly shaped, as well as smoothed and burnished. When the articles are not of a circular form, and accordingly cannot be produced by means of the wheel, they are either pressed or cast in molds of plaster of Paris. In the former case the paste used is of the same consistence as that employed on the wheel; in the latter molds of the same sort are used, but the clay mixture is poured into them in the condition of slip. By the absorption of the water in the parts next the dry mold a crust is formed of greater or less thickness, according to the time that the liquid is allowed to remain. The molds are in two or more pieces, so as to be easily detached from the molded article.

When shaped and dried the articles are ready for the kiln, in which they are exposed to a high temperature until they acquire a sufficient degree of hardness for use. The paste of which the earthenware is composed is thus converted into what is called *bisque* or *biscuit*. While undergoing this process of baking the articles are enclosed in larger vessels of baked fire clay, called *saggers*, to protect them from the fire and smoke, and to distribute the heat more uniformly. The whole firing lasts from 40 to 42 hours. After the kilns have been allowed to cool very slowly, the articles are taken out, and if they are not to be decorated in color, and sometimes also when they are to be so decorated, they are immersed in a vitrifiable composition called *glaze*, which, after the vessels have a second time been subjected to heat in glazed *saggers*, is converted into a coating of glass, rendering the vessels impermeable to water.

These processes are all that are necessary to complete a plain earthenware vessel, but very frequently the vessels are adorned with printed or painted decorations executed in colors, such

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as may be burned into the substance of the article. There are two methods of printing on earthenware: press printing, which is done on the *bisque*, and bat printing, done on the glaze. In both cases an engraving is first executed in copper, and thence transferred, by means of a sheet of paper containing an impression, to the article requiring to be printed; but the processes are slightly different in detail. When the vessel has received its impression it is ready to be fired in the enamel kiln. Painting on earthenware is effected with a brush over the glaze.

All the numerous varieties of earthenware are made in the manner just described, with only slight modifications in the nature of the ingredients of their composition or the processes of manufacture. Stoneware may be formed of the clays which are used for other vessels, with the addition of different sorts of sand, and sometimes of cement. A greater degree of heat is applied than in the case of ordinary earthenware, and when some fluxing substance is added it has the effect of producing that state of semi-fusion which is the distinguishing quality of stoneware. A kind of semi-vitrified ware, first made by Wedgwood, takes its name from him. It is made of two different kinds of pastes, both very plastic. This ware is incapable of taking on a superficial glaze; but by a process called *smearing*, which is simply baking at a high heat in *saggers* coated internally with a glaze, acquires a remarkable luster.

Porcelain or chinaware is formed only from argillaceous minerals of extreme delicacy, united with siliceous earths capable of communicating to them a certain degree of translucency by means of their vitrification. Porcelain is of two kinds, hard and tender. Both consist, like other earthenwares, of two parts—a paste which forms the biscuit, and a glaze. The biscuit of hard porcelain is composed of kaolin or china clay, and of decomposed feldspar. The glaze consists of a feldspar rock reduced to a fine powder, and mixed with water, so as to form a milky liquid into which the articles are dipped after a preliminary baking. Tender porcelain biscuit is made of a vitreous frit, composed of siliceous sand or ground flints, with other ingredients added, all baked together in a furnace till half fused, and then reduced to a condition of powder. The glaze of tender porcelain is a specially prepared glass ground fine, and made into a liquid by mixing with water. The processes employed in manufacturing porcelain wares are very much the same as those used for other kinds of earthenware, but requiring more delicacy and care. The biscuit paste even of hard porcelain has so little tenacity compared with that of earthenware that it cannot easily be shaped on the wheel, and is consequently more frequently molded. The paste of tender porcelain is still less tenacious, so that the wheel cannot be used for it at all, and a little muclage of gum or black soap must be added before it can be worked even in molds. During the baking, too, it becomes so soft that every



part of an article must be supported. Tender porcelain receives two coats of glaze.

Metallic oxides incorporated with some fusible flux, such as borax, flint, etc., are used for painting on porcelain. The colors are mixed with essential oils and turpentine, and applied by means of a camel's-hair brush. When the painting is finished the vessels are baked in a peculiar kind of ovens called *muffles*, which are also used for fixing the printed figures on the glaze of stoneware. By the operation of the furnace most of the colors employed in painting porcelain become quite different, and the change which takes place in them is usually through a series of tints, so that the proper tint will not be obtained unless the baking is stopped precisely at the proper time. Sometimes porcelain has designs etched on it by means of fluoric acid. Sculptures also are executed by casting in moulds in various kinds of porcelain, called statuary porcelain, Parian, Carrara, etc.

**Pottinger** (pot'in-jër), ELDRÉD (1811-1856), British officer, famed for his defense of Herat in 1838, was b. in Ireland. In 1837 he traversed Afghanistan in disguise, and reached Herat after many risks. The city was then held by an Afghan prince, and was besieged by the Persians for nearly a year, when it was relieved by a British diversion in the Persian Gulf. The credit of the defense was given to Pottinger. Major Pottinger took a leading part in the disastrous Afghan war of 1841-42, and as political agent had to sign terms with the rebels, which were afterward repudiated by Lord Ellenborough. A trial by court martial only served to show his conduct in brighter colors. He d. at Hong-Kong.

**Pottstown**, Montgomery co., Pa., on Schuylkill River, 40 mi. n.w. of Philadelphia. Railroads: Pennsylvania; and Philadelphia & Reading. Industries: iron and steel manufacture, rolling mills, furnaces, steel mills, nail works, etc., also foundries and machine shops, and agricultural implement works. Pop. 1900, 13,696.

**Pottsville**, Schuylkill co., Pa., on Schuylkill River, 93 mi. n. of Philadelphia. Railroads: P. & R.; Lehigh Valley; P. & S. V.; P. & E.; and People's Ry. Industries: iron and steel co., coal and iron works, silk mill, three knitting mills, cigar and shirt factories. Surrounding country mining. The town was first settled about 1820. Pop. 1900, 15,710.

**Poughkeepsie**, Dutchess co., N. Y., on Hudson River, 74 mi. n. of New York. Railroads: N. Y. C. & H. R.; West Shore; Poughkeepsie & Eastern; P. R. & N. E. Industries are various, including manufacture of boots and shoes, iron and cotton goods, farming implements, carriages, carpets, dye stuffs, etc. It is a center of education, the principal institution being Vassar College. Near here is the Hudson River State Hospital for the Insane. Pop. 1900, 24,029.

**Poultry**, a general name for all birds bred for the table, or kept for their eggs. The birds most commonly included under this designation are the common fowl, the pea

fowl, the guinea fowl, the turkey, goose, and duck. There is this great difference between the varieties of the domestic fowl, that some are disposed by constitution to continue laying throughout the whole season without sitting; while others after having laid from twelve to fifteen eggs sit obstinately, and cease to lay. Among the breeds most in favor are those known as Dorking, Game, Hamburg, Cochin, Brahma, Scots Gray, Polish, Spanish, etc. Poultry, if they are to be kept for profit, should have a spacious house, with a yard and shed attached. The house should be moderately warm, well lighted, and perfectly dry. Either boxes must be formed along the walls to serve as nests for the fowls, or shelves on which baskets for the nests may be put. These boxes and shelves may be formed of wood; but they are better when constructed of smoothly polished flagstones or slates. Turkeys and geese would better not occupy at night the same house with hens and ducks, as they are apt to be mischievous, especially to sitting birds. A small pond is sufficient for the thrifty rearing of both geese and ducks.

**Pound**, weight of two different denominations, *avoirdupois* and *troy*. The pound *troy* contains 5,760 grains, and is divided into 12 ounces; the pound *avoirdupois* contains 7,000 grains, and is divided into 16 ounces. The *pound*, or *pound sterling*, the highest monetary denomination used in British money accounts, and equal to 20 shillings, was so called from originally being equal to a quantity of silver weighing one pound. The pound is strictly a money of account, the coin representing it being the sovereign.

**Poussin**, NICOLAS (1594-1665), a distinguished French historical and landscape painter, b. at Andelys in Normandy. In 1630 he married, and about this time his affairs, which had hitherto possessed a precarious aspect, began to improve. He found liberal patrons in Cardinal Barberini and in the Cavaliere Cassiano del Pozzo, for whom he painted the celebrated *Seven Sacraments*, now at Belvoir Castle. He was also invited to paint the great gallery of the Louvre; and his successes gained him the position of first painter to Louis XIII, with a pension of 3,000 livres. From 1640 to 1642 he resided in Paris; but the rivalry of French painters and the want of appreciation of his works evinced by the Parisians induced him to return to Rome, where he lived until his death.

**Powderly**, TERENCE V., b. in Pennsylvania in 1849. He began life as a switchman, and early in life was identified with various labor organizations. He was elected mayor of Scranton, Pa., in 1877 and again in 1878. The following year he was elected general master workman of the Knights of Labor. He has contributed largely to the *Arena* and to the *North American Review*. He was appointed commissioner general of immigration in 1897 by President McKinley.

**Powell**, JOHN WESLEY, geologist, was b. in Mount Morris, N. Y., in 1834. In the Civil War he rose to be lieutenant colonel, losing an

## Power of Attorney

arm at Shiloh. In 1867 and years following, under direction of Smithsonian Institution and Department of the Interior, he conducted the geographical and geological survey of the Rocky Mountain region. His *Contributions to North American Ethnology* are embraced in 3 vols. In 1881 he was appointed director of the U. S. Geological Survey. His publications include many scientific papers and addresses, and numerous government volumes. He has been president of the Anthropological Society of Washington and of the American Association for Advancement of Science.

**Power of Attorney**, in law, is a deed or written instrument whereby one person is authorized to act for another as his agent or attorney, either generally or in a special transaction.

**Powers, HIRAM** (1805-1873), sculptor, the son of a farmer, b. at Woodstock, Vt, in 1805. He early displayed great ingenuity in mechanical matters, and became somewhat noteworthy on this account while acting as a shopman and assistant to a clockmaker of Cincinnati. He next obtained employment in a museum in that city. At this period he formed the acquaintance of a German sculptor, and having been taught modeling by him, determined to become himself a sculptor. In 1835 he went to Washington, and had sufficient success there to enable him to proceed to Italy. He now settled in Florence, where he resided until his death. He is distinguished in portraiture, and produced busts of many of the most noted American statesmen. His most famous ideal works are the statue of *Eve*, the *Greek Slave*, and the *Fisher Boy*.

**Powers, THE GREAT**, a term of modern diplomacy, by which are now meant Britain, France, Austria, Germany, Italy, and Russia.

**Prætor**, an important official in the ancient Roman state. Up to 367 B.C. the title was merely an adjunct to that of consul; but when at that date the consulship was thrown open to the plebeians, the judicial functions of the consul were separated from his other duties and given to a new patrician magistrate, who was entitled the prætor. In 337, after a struggle, the plebeians were also admitted to this office. In 246 B.C. another magistracy, that of *prætor peregrinus*, was instituted for the purpose of settling disputes between foreigners and between foreigners and citizens; and in distinction from him who filled this office the other functionary was termed *prætor urbanus*. After election the two prætors determined their offices by lot. The *prætor urbanus* was the first in position, and was the chief magistrate for the administration of justice. To the edicts of the successive prætors the Roman law is said to owe in a great measure its development and improvement. About B.C. 227 the number of prætors was increased to four; afterward to six and eight; and under the empire the number varied from twelve to eighteen. After completing his year of office the prætor was often sent as *proprætor* to govern a province.

**Prague** (pråg), the capital of Bohemia, a prosperous and well-built city near the center

## Prairie Dog

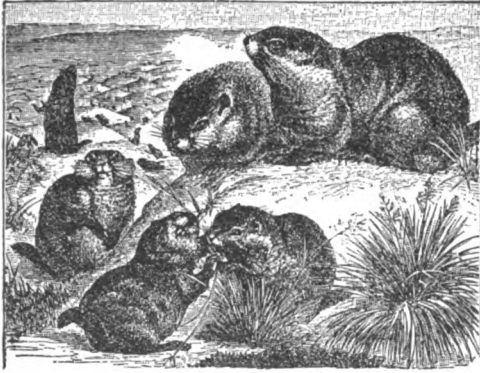
of the kingdom, on both sides of the Moldau, here crossed by seven bridges; 153 mi. n.w. of Vienna and 75 mi. s.e. of Dresden, with both of which it is connected by railway. Its site is a regular basin, cut in two by the river, from the banks of which the houses rise on both sides till they are terminated and enclosed by hills of considerable height. Among the public buildings of Prague are the old castle, or palace of the Bohemian kings; the Roman Catholic cathedral; the Jesuit college, called the Clementinum; the Carolinum, or college of law and medicine; the townhall; the Teynkirche, or old church of the Hussites; the palace of Wallenstein, etc. The manufactures of Prague are of great variety, including gold and silver embroidery, silk, woolen, cotton, and linen goods, porcelain, and jewelry. The suburbs of Karolinenthal and Smichow, with populations of 20,000 each, are quite modern, and are busy industrial centers. Prague is one of the oldest towns in the kingdom, dating from the eighth century. Its university was founded in 1348, and had at one time about 10,000 students. Recently it was divided into two universities, a German and a Czech, or Bohemian, having together more than 3,500 students. The city was long greatly disturbed by the struggles between the Roman Catholics and the Hussites. It suffered severely also in the Thirty Years' War. In 1631 the city was captured by the Saxons, who were driven out a few months later by Wallenstein. Since that date it has passed through many vicissitudes. In 1742 it was taken by the French and Bavarians, and two years later capitulated to Frederick the Great. After the Seven Years' War the city made rapid strides. During the Austro-Prussian war in 1866 Prague was occupied by the Prussians, and here the treaty of peace was signed August 23. Pop. 162,323.

**Prairie**, the name given to the vast natural meadows or plains of the Mississippi Valley, especially lying between it and the Rocky Mountains, and extending northward into Central Canada. Throughout this immense territory the differences of level are sufficient to produce a steady flow of the rivers, but not so great as to obstruct their navigation, thus securing a unique system of easy intercommunication between all sections of the country. There is a great sameness in the features of the topography, the vegetable productions, the soil, the geological features. Some of the prairies that have a peculiarly undulating surface are known as *rolling prairies*. Vast herds of buffaloes used to roam over the prairies, but these have now disappeared. Immense tracts are now cultivated, and produce large crops of wheat and maize with little outlay of labor on the part of the farmer.

**Prairie Dog** (or Prairie Marmot), a small rodent animal, allied to the marmot as well as to the squirrel, and found on the prairies west of the Mississippi and east of the Rocky Mountains. These animals live gregariously in burrows, and are characterized by a sharp bark, like that of a small dog, whence their popular name. They are about 1 ft. in length exclu-

## Prairie Hen

sive of the tail, which is rather short. Their burrows are quite close together, and have a mound of excavated earth near the entrance, on which the little animals are wont to sit and look around them. These communities are termed "villages." A second species, *C. columbianus*, inhabit the region west of the



Prairie Dog.

Rockies. The prairie dog is not to be confounded with the prairie squirrel, to which it is allied.

**Prairie Hen**, the popular name of the pinnated grouse of the U. S. The neck of the male is furnished with neck tufts of eighteen feathers, and is remarkable also for two loose pendulous wrinkled skins which somewhat resemble an orange on inflation. The prairie hen is much prized for the table.

**Prairie Squirrel** (or Gopher), a name for several animals found in the prairies in great numbers. They live in burrows, and not on trees, and much resemble the prairie dog or marmot. They have cheek pouches, in which their food is carried. This consists of prairie plants with their roots and seeds.

**Prairie Wolf** (or Coyote), the small wolf which is found on the prairies, believed by many to be a mere variety of the European wolf. It is a cowardly animal, and only dangerous to man when in packs and pressed by hunger.

**Pratt Institute**, a co-educational institution for manual and industrial training established in Brooklyn, N. Y., in 1887, by Chas. Pratt. The institute comprises a high school, providing for a general education, and normal, technical and trade departments. The institute conducts both day and evening classes. The department of domestic art is especially famous for its excellent courses in sewing and cooking. In 1904 the instructors numbered 124, the students 3,485, and the library contained 77,126 volumes. The president is Chas. M. Pratt.

**Praxiteles** (-lēz), one of the greatest sculptors of ancient Greece, a citizen, if not a native of Athens, flourished about 364 B.C. He and his contemporary Scopas stand at the head of the later Attic school, so called in contradistinction to the earlier Attic school of Phidias. Without attempting to rival Phidias in grand-

## Préfet

eur, Praxiteles chose subjects which demanded a display of the human form, especially in the female figure. The finest is said to have been the Cnidian Aphroditē (Venus), whom he was the first to represent naked. The group of Niobe and her children, now in existence at Florence, is by some attributed to Praxiteles, and by others to Scopas. His two statues of Eros (Cupid) were also celebrated; one of them, placed in the temple of Eros, at Thespia, and the statue of a satyr, were regarded by Praxiteles, according to Pausanias, as his finest works. An excellent copy of the latter still exists. Among his works were statues of Apollo, Dionysos, Demeter, etc., in marble and in bronze, which served as models to succeeding artists. Quite recently, a marble statue of Hermēs by Praxiteles has been discovered at Olympia.

**Precession of the Equinoxes**, a slow motion of the line of intersection of the celestial equator or equinoctial and the ecliptic, which causes the positions occupied by the sun at the equinox to move backward or westward at the mean rate of 50.25" per year. This motion of the equinox along the ecliptic carries it, with reference to the diurnal motion, continually in advance upon the stars; the place of the equinox among the stars, with reference to the diurnal motion, thus precedes at every subsequent moment that which it previously held, hence the name. This sweeping round in the heavens of the equinoctial line indicates a motion of the axis of rotation of the earth, such that it describes circles round the poles of the ecliptic in 25,791 years. Nutation is a similar, but much smaller gyratory motion of the earth's axis, whose period is about nineteen years. From these two causes in combination the axis follows a sinuous path, instead of a circle, about the pole of the ecliptic. Nutation causes the equinoctial points to be alternately in advance of and behind their mean place due to precession by 6.87". At present the vernal equinoctial point is in the zodiacal sign Pisces, and it is moving toward the sign Aquarius.

**Precipitate**, in chemistry, a solid body produced by the mutual action of two or more liquids mixed together, one or other of them holding some substance in solution. The term is generally applied when the solid appears in a flocculent or pulverulent form. Substances that settle or sink to the bottom like earthy matters in water are called sediments, the operating cause being mechanical, not chemical. Red oxide or peroxide of mercury is often called *red precipitate*.

**Préfet** (prā-fā), the title of an important political functionary in France, whose office was created in 1800 at the instance of Napoleon. There is a préfet at the head of each department, who is intrusted with the whole organization and management of the police establishments; but not with the punishment of police offenses. Within this sphere of action the préfets are unchecked; the sous-préfets, who are appointed by them, and who stand at the head of the districts, are entirely subject to their commands; and the authorities of the



## Prentiss

communes, as well as the justices of the peace, can set no limits to their activity. In time of tumult they can call out the military, or provisionally declare a state of siege. The council of the *préfecture* is a court in which are settled all disputes respecting the taxation of individuals, engagements with the state for building, the indemnification of those who have had to give up anything to the public, etc. Of this court the *préfet* is president, and in it he has a casting vote. The appeals against its decisions lie to the council of state.

**Prentiss**, SERGEANT S. (1808-1850), orator, b. in Portland, Me., removed to Mississippi in 1827. As a lawyer in the front rank; as a speaker remarkable for wit, sarcasm, and argumentative power, his manner of speaking was at once natural and dramatic.

**Presbyter**, an office bearer in the early Christian church, the exact character and position of whom is differently regarded by different authorities. Presbyterians generally maintain that originally *bishop* and *presbyter* were one and the same; Episcopalians generally maintain that from the first they were different, as was certainly the case in very early times. By the end of the second century the presbyters held a position in connection with the congregations intermediate between that of bishop and deacon, and represented the priests or second order of clergy.

**Presbytery**, a judicatory, consisting of the pastors of all the churches of any particular Presbyterian denomination within a given district, along with their ruling (i.e., presiding) elders, there being one ruling elder from each church session commissioned to represent the congregation in conjunction with the minister. The functions of the presbytery are, to grant licenses to preach the gospel, and to judge of the qualifications of such as apply for them; to ordain ministers to vacant charges; to judge in cases of reference for advice, and in complaints and appeals which come from the church sessions within the bounds of the presbytery; and generally to superintend whatever relates to the spiritual interests of the several congregations under its charge, both in respect of doctrine and discipline. Appeals may be taken from the presbytery to the provincial synod, and thence to the general assembly.

**Prescott**, WILLIAM HICKLING (1796-1859), historian, b. in Salem, Mass. His father was a lawyer, the son of Col. William Prescott, who commanded the American forces at the battle of Bunker Hill. In 1811 he entered Harvard College, and graduated in 1814. While at college he met with an accident to his left eye, completely depriving him of its use forever afterward, and rendering the other eventually so weak that during the latter half of his life he could scarcely use it. After two years spent in traveling through England, France, and Italy, chiefly for health, he returned to America, where he married, and set himself assiduously to literary labor. The earliest fruits of this were contributions to the *North American Review*; and for many years his only productions were essays and magazine articles.

## Preserved Provisions

Acquaintance with Spanish literature, which he began to cultivate in 1824, led him to attempt his first great work on Spanish history, the *Reign of Ferdinand and Isabella*, published 1837. It was received with enthusiasm both in America and Europe; was rapidly translated into French, Spanish, and German; and its author was elected a member of the Royal Academy at Madrid. Prescott's next work was the *History of the Conquest of Mexico*, with a *Preliminary View of the Ancient Mexican Civilization*, and the *Life of the Conqueror Hernando Cortez*, which appeared in 1843, and was received with an equal degree of favor. In 1847 he published the *History of the Conquest of Peru*, with a *Preliminary View of the Civilization of the Incas*. In 1855 the first two volumes of the long expected *History of the Reign of Philip II, King of Spain*, appeared, and proved to the public equally acceptable with Prescott's former works. In 1858 was published a third volume; but the sudden death of the author from apoplexy put a stop to his labors. Prescott affords a remarkable instance of the success of indomitable industry and perseverance, carried out in spite of the affliction of partial and latterly almost total blindness.

**Prescription**, in law, is a right or title acquired by use and time; the object being to secure the title to property to him who has had the possession of it for the term fixed by the law, and to prevent any one from disturbing his possession after such term has expired. In American practise prescription presupposes a lost grant, and can therefore give a title to those things only which can pass by grant. In almost all the states there are express statute provisions regulating the doctrine of prescription. Generally an uninterrupted possession of twenty years is required for the acquisition of real rights. In some states a notification by the owner of the land to the occupant that his intention is to contest the title may defeat prescriptive acquisition.

**Presentment**, in law, is properly speaking the notice taken by a grand jury of any offense, from their own knowledge or observation, without any bill of indictment being laid before them at the suit of government.

**Preserved Provisions** (Preserves).—The preservation of dead organized matter from the natural process of decay is a most useful means of increasing and diffusing the food supply of the world. Animals, vegetables, and fruits may all be easily preserved for this purpose. The preserving of fruits is an old and familiar process. This is generally effected by boiling or stewing, though drying is also frequently resorted to, where the fruit is meant to be kept intact. Fruits intended for confectionery are preserved in four different ways: 1, In the form of jam, in which the fruit is boiled with from one half to about equal its weight of sugar. 2, In the form of jelly, in which the juice only is preserved, by being carefully strained from the solid portions of the fruit, and boiled with a third to a half of its weight of sugar. 3, By candying, which consists in taking the fruits whole or in pieces, and boi-

## Preserved Provisions

ing them in a clear syrup of sugar previously prepared. They absorb the syrup which is then crystallized by the action of a gentle heat. 4, By stewing them in a weak syrup of sugar and water till they become soft but not broken, and transferring them with the syrup to jars, adding pale brandy equal in quantity to the syrup. Several kinds of vegetables, as cabbages, cucumbers, cauliflowers, onions, are preserved by pickling. See *Pickles*. Antiseptics are used to preserve meat also, salting being the most common process. But to preserve large quantities of vegetable and animal products for food purposes, and at the same time to keep them nearly in their fresh state, they must be subjected to one of three processes. These are, drying, refrigeration, and exclusion of air. With vegetables, which contain so large an amount of water in proportion to their solid and nutritious material, the process of drying is peculiarly applicable, and it is largely employed as the means of furnishing fresh vegetable food for ships in a compact and portable form, when, in addition to desiccation, compression is also employed.

The preservation of articles of food by the application of cold is the simplest of all known methods, and in such climates as North America, Russia, etc., it is largely taken advantage of. In 1875 ice began to be used to preserve fresh meat in considerable quantities, which was sent from America to Europe. In 1879 the invention of the Bell-Coleman refrigerator increased immensely the facilities for such a traffic. This invention has been succeeded by others, chief among them being the Haslam refrigerator; and the result is that the distribution of meat over the surface of the globe is being revolutionized. The modern methods of refrigeration for carrying purposes consist of an air-tight room on board ship, where the meat is kept, and through which dry cold air is made to circulate by means of special machinery driven by steam, the air being first compressed and cooled, and a further cooling taking place when it is again allowed to expand.

The process of preservation by exclusion from the action of atmospheric air is yearly assuming more importance and being more largely practised. The most perfect method, and that which is now most generally resorted to, is the enclosure of the food in air-tight cases, from which the air is then expelled; upon the perfection of the air-excluding process depends entirely the preservation of the article. The first successful attempt to preserve fresh meat in this way was made in 1809 by M. Appert, a Frenchman. The plan now generally adopted is commonly known as *canning*, and is applicable alike for flesh meats, vegetables, and fruits. The process is usually as follows: The provisions of whatever kind are packed into a tin cylinder, and the interstices filled in with water or other appropriate fluid, as gravy in the case of flesh food. The lid, which is perforated with a small aperture or pin-hole, is soldered carefully down. The cases are then set in a bath of solution of chlo-

## Press

ride of calcium; heat is applied until the whole boils, and the air is thus expelled through the pin-holes. These holes are then hermetically closed, and the canister and its contents are once more subjected to the operation of heat until the provisions are perfectly cooked. When it has become cool the canister is coated over with paint and removed to the proving room, an apartment the temperature of which has been raised to the degree of temperature most favorable to decomposition. If the operation has been successfully performed, the ends or sides of the canisters will have fallen in to some extent from the outward pressure of the air. If, after the interval of some days, the ends bulge out, it is a certain sign that the process has not been successful, the liberated gases causing the outward pressure. Such cases should be rejected or submitted again to the process. Not only may bottled provisions be preserved in this way, but roast meats also. An improvement on this process has been effected by introducing into the canisters a small quantity of sulphite of soda, which causes the absorption of any traces of free oxygen which may lurk in the cases.

**President**, the supreme executive officer of the U. S. The qualifications of a person raised to this dignity are to be a natural-born citizen of the age of 35 years, and to have resided 14 years within the U. S. The election is by electoral colleges in every state. In his legislative capacity the president has the power of approving bills sent to him after passing Congress, or of returning them to the house in which they originated. In his executive capacity he is commander in chief of the army and navy; his powers are prescribed in the Constitution. He holds his office for four years and is eligible for re-election. See *U. S.*

**Press**, **LIBERTY OF THE**, the liberty of every citizen to print whatever he chooses, which at the same time does not prevent his being amenable to justice for the abuse of this liberty. The right of printing rests on the same abstract grounds as the right of speech, and it might seem strange to a man unacquainted with history that printing should be subjected to a previous censorship, as it is in some states, and has been in all, any more than speaking, and that the liberty of the press should be expressly provided for in the constitutions of most free states. But when we look to history we find the origin of this, as of many other legislative anomalies, in periods when politics, religion, and individual rights were confusedly intermingled. It is only since men's views of the just limits of government have become clearer that the liberty of the press has been recognized as a right. The constitutions of many of the states declare, as we should expect, for liberty of the press. The same may be said of all the South American republics. Among European countries, it may be generally said the liberty of the press is found most predominant among the weaker powers, such as Spain, Turkey, Sweden and Norway, Switzerland, and Roumania; in France the press may be said to be comparatively free; while in

## Pressburg

Germany, Austria, and particularly in Russia there are still many restrictions. In England the press is practically free.

**Pressburg** (or Presburg), a town in Hungary, 35 mi. e. of Vienna, beautifully situated on the left bank of the Danube, and on spurs of the Little Carpathians. The most striking edifice is the ruined royal palace. The cathedral is a large Gothic structure, which has latterly been considerably modernized; here the kings of Hungary were crowned. The Franciscan church is also noteworthy. There are also several palaces, including that of the primate of Hungary. The river is here crossed by a bridge of boats. The manufactures are various. The trade, particularly transit, and chiefly in corn and timber, is extensive. Pressburg is a place of very great antiquity, and was long a fortress of some strength. In 1541, when the Turks captured Buda, it became the capital of Hungary, and retained the honor till the Emperor Joseph II restored it to Buda. The treaty by which Austria ceded Venice to France and the Tyrol to Bavaria was signed here in 1805. Pop. 48,284, fully more than half of whom are Germans, and 7,000 Jews.

**Preston**, a municipal and parliamentary borough of England, in Lancashire, 27 mi. n.e. of Liverpool, agreeably situated on a height above the right or north bank of the Ribble, near the head of its estuary. Preston has some fine buildings. The original staple manufacture of the town was linen, which is still woven to some extent, but has been completely eclipsed by the cotton manufacture, of which Preston is now one of the chief centers. Preston also has machine shops, iron and brass foundries, railway carriage works, breweries, malt houses, roperies, tanneries, etc. Some shipping trade is carried on, and extensive harbor and river diversion works are in course of construction. Pop. 107,573.

**Preston**, HARRIET W., b. in Massachusetts in 1843. Her first literary work was translations of *Sainte Beuve*, *Musset*, and *Mistral*. Her books are *Love in the Nineteenth Century*, *Troubadours and Trouveres*, and *A Year in Eden*.

**Presumption**, in law, is the assuming of a fact or proposition as true, and is of two kinds, *presumptio juris* and *presumptio juris et de jure*. The *presumptio juris* is a presumption established in law till the contrary be proved, e. g., the possessor of goods is presumed to be the owner. The *presumptio juris et de jure* is that where law or custom establishes any proposition that cannot be overcome by contrary evidence, as the incapacity in a minor with guardians to act without their consent.

**Pri'am**, in Greek legend, the last king of Troy, the son of Laomedon. By his second wife, Hecuba, he had, according to Homer, nineteen children, the most famous being Hector, Paris, Cassandra, and Troilus. His name has been rendered famous by the tragical fate of himself and his family, as a result of the Trojan War. When he was extremely old the Greeks demanded of him the restoration of Helen, who had been carried away by Paris, and on his refusal to give her up they made

## Priestley

war against Troy, and took and destroyed the city, after a siege of ten years. Homer gives no account of the death of Priam; but other poets represent him to have been slain at the altar of Zeus by Pyrrhus the Greek.

**Pria'pus**, a Greek deity, the deformed son of Dionysus and Aphrodite, a god of gardens, fruits, etc., considered by mythologists to represent fertility in nature. He was worshiped in all parts of Greece, and also in Rome.

**Prib'ylov** (or Pribyloff) **Islands**, a group of islands on the coast of Alaska, in Bering Sea. The largest are St. Paul, St. George, Walrus, and Beaver Islands. They are frequented by numbers of fur-seals. The natives are Aleutians.

**Prickly Ash**, a name given to several prickly shrubs found in this country. They have an aromatic and pungent bark, which from being used as a remedy for toothache gains them the name of *toothache tree*.

**Prickly Pear**, a fleshy and succulent plant, destitute of leaves, covered with clusters of spines, and consisting of flattened joints inserted upon each other. The fruit is purplish in color, covered with fine prickles and edible. The flower is large and yellow. It is a native of the tropical parts of America, whence it has been introduced into Europe, Mauritius, Arabia, Syria, and China. It is easily propagated, and in some countries is used as a hedgeplant. It attains a height of 7 or 8 ft.

**Priest**, in its most general signification, a man whose function is to inculcate and expound religious dogmas, to perform religious rites, and to act as a mediator between worshippers and whatever being they worship. In some countries the priesthood has formed a special order or caste, the office being hereditary; in other countries it has been elective. In sacred history the patriarchal order furnishes an example of the family priesthood. Abraham, Isaac, and Jacob perform priestly acts, and "draw near to the Lord," as also does Job, and the Arab sheikh to this hour unites in his person the civil and religious headship. The Mosaic priesthood was the inheritance of the sons of Aaron, of the tribe of Levi. The order of the priests stood between the high priest on the one hand and the Levites on the other. In some churches, the name priest is not used, minister, pastor, etc., being the term employed instead. Those Christians, however, who, like the Roman Catholics, Greeks, etc., look upon the eucharist as a sacrifice, regard the priest as performing sacrificial duties, and as standing in a special relation between God and his fellow men. The priests of the Church of Rome are bound to a life of celibacy; but in the Greek Church a married man may be consecrated a priest. In the Anglican and other Episcopal churches the priests form the second order of clergy, bishops ranking first. Diverse views of the priestly office are held in the Anglican and allied churches.

**Priestley**, JOSEPH (1733-1804), an English philosopher and divine, was b. near Leeds. At the age of nineteen he was placed at the Dis-



## Prim

senting Academy at Daventry, where he spent 3 years. In 1761 he became a teacher in the Dissenting Academy at Warrington, and while here wrote a *History of Electricity*, which gained him admission to the Royal Society, and the degree of LL.D. from the University of Edinburgh. In 1767 he became minister of the Mill Hill chapel at Leeds. While here he published his *History and Present State of Discoveries Relating to Vision, Light, and Colors*, his next important work being *Institutes of Natural and Revealed Religion*. In 1774 he discovered oxygen or "dephlogisticated air," as he called it, a result which he quickly followed by other important discoveries in chemistry. Among his works belonging to this period are *Experiments and Observations on Different Kinds of Air*; *An Examination of Dr. Reid's Inquiry into the Human Mind*; *Hartley's Theory of the Human Mind*; *The Doctrine of Philosophical Necessity*; etc. He next removed to Birmingham, where he became once more minister of a Dissenting congregation, and wrote *History of the Corruptions of Christianity*; *History of Early Opinions Concerning Jesus Christ*; *General History of the Christian Church*; etc. Owing to his favorable opinions regarding the French Revolution a mob assembled and set fire to his house, and in the conflagration his apparatus and manuscripts were destroyed. For this insane outrage he received compensation. On quitting Birmingham he became president of the Dissenting college at Hackney, but was goaded by party enmity to seek an asylum in the U. S. in 1794. He took up his residence at Northumberland, in Pennsylvania, where he died. As a man of science he stands high, while as a theologian, and especially as a historical theologian, he ranks low.

**Prim, JUAN, MARQUIS DE LOS CASTILLEJOS, COUNT DE REUSS** (1814-1870), field marshal and grandee of Spain, was b. at Reuss, in Catalonia. On the outbreak of the civil war, 1813, he joined the volunteers who had taken up arms in the cause of the infant queen Isabella, and rose so rapidly that in 1837 he was appointed a colonel in the regular army. On the downfall of the Espartero ministry Prim was appointed by the queen a brigadier general, and afterward created Count de Reuss and governor of Madrid (1843). On the occasion of a democratic rising at Barcelona he was sent to restore order, but with little success. The revolt soon began to attain wide proportions, and Prim was accused of dilatoriness and dismissed from his command. In November, 1844, he was brought to trial for his share in a conspiracy for the assassination of Narvaez, president of the council, and convicted and sentenced to six years' seclusion in a fortress, a sentence which was revoked by the queen in 1845. After some years of service under the Turks he returned to Spain, and was in 1857 promoted to the rank of lieutenant general, and in 1858 raised to the senate. In the following year, war having broken out between Spain and Morocco, Prim was appointed to the command of the reserve, and his successes in this war gained him the title of Marquis de los Castillejos. In 1861 he

## Primrose

was appointed to command the Spanish contingent. He assisted greatly the movement which ended in the downfall of Queen Isabella, after which he was appointed minister of war, and exerted himself to find a suitable candidate for the Spanish crown. This was at last found in the person of Amadeo, Duke of Aosta, second son of the King of Italy. Marshal Prim was shot by assassins.

**Pri'mary**, in geology, a term applied by the early geologists to rocks of a more or less crystalline structure, supposed to owe their present state to igneous agency. They were divided into two groups; *stratified*, consisting of gneiss, mica schist, argillaceous schist, hornblende schist, and all slaty and crystalline strata generally; and *unstratified*, these being chiefly granite. By geologists of the present day the term primary is used as equivalent to *palaeozoic*, the name given to the oldest known group of stratified rocks, extending from the Pre-cambrian to the Permian formation.

**Primogeniture**, in England, the right of the eldest son and those who derive through him to succeed to the property of the ancestor. The firstborn in the patriarchal ages had among the Jews a superiority over his brethren, but the "insolent prerogative of primogeniture," as Gibbon denominates it, was especially an institution developed under feudalism. Before the Norman conquest the descent of lands in England was to all the sons alike, but latterly the right of succession by primogeniture came to prevail everywhere, except in Kent, where the ancient gavelkind tenure still remained. The right of primogeniture is entirely abolished in France and Belgium, but it prevails in some degree in most other countries of Europe. The rule operates only in cases of intestacy, and is as follows: When a person dies intestate, leaving real estate, his eldest son is entitled by law to the whole. If the eldest son is dead, but has left an eldest son, the latter succeeds to the whole of the property. If the whole male line is exhausted, then the daughters succeed—not in the same way, however, but jointly, except in the case of the crown, to which the eldest succeeds. In the U. S. no distinction of age or sex is made in the descent of estate to lineal descendants.

**Primrose**, a genus of beautiful low Alpine plants, natural order Primulaceæ. Some are among the earliest flowers in spring, as the



Evening Primrose.

common primrose, the oxlip, and cowslip; and

## Prince

several Japanese and other varieties are cultivated in gardens as ornamental plants. Their roots are perennial; the leaves almost always radical and the flowers supported on a naked stem, and usually disposed in a sort of umbel.



Common Primrose.

The different varieties of the common primrose which have arisen from cultivation are very numerous.

**Prince**, literally one who holds the first place. In modern times the title of prince (or princess) is given to all sovereigns generally, as well as to their sons and daughters and their nearest relations. In Germany there is a class of sovereigns, ranking next below the dukes, who bear the title of prince as a specific designation; members of royal families are, however, denominated *Prinzen*. On the continent there are many ancient families not immediately connected with any reigning house who bear the title of prince.

**Prince Edward Island**, an island forming a province of the Dominion of Canada, in the Gulf of St. Lawrence, and separated by Northumberland Strait from New Brunswick on the east and Nova Scotia on the south; greatest length, from east to west, about 130 mi.; breadth, varying from 4 to 34 mi.; area about 2,134 sq. mi. or 1,365,760 acres, of which over 1,000,000 are under cultivation. The coast line presents a remarkable succession of large bays and projecting headlands. The surface undulates gently, nowhere rising so high as to become mountainous, or sinking so low as to form a monotonous flat. The island is naturally divided into three peninsulas, and the whole is eminently agricultural and pastoral, the forests now being of comparatively limited extent. The soil consists generally of a light, reddish loam, sometimes approaching to a strong clay, but more frequently of a light and sandy texture. The prevailing rock is a reddish sandstone, but a large part of the surface is evidently alluvial. The climate is mild; winter, though longer and colder than in England, is free from damp unwholesome chills; and summer, without being oppressively hot, is fitted to promote the growth of all the ordinary cereals. Sheep, cattle, and horses are reared in numbers; cod, mackerel, herring, oysters, and lobsters form the most productive

## Princeton University

part of the fisheries. The manufactures are chiefly confined to linen and flannels for domestic use; there are also several tanneries, and shipbuilding is carried on to a considerable extent. The exports consist of timber, agricultural produce, and live stock, the imports of dry goods, hardware, cordage, iron, etc. A railway runs from one end of the island to the other. The capital is Charlottetown. The public affairs of the island are administered by a lieutenant governor nominated by the crown, who appoints an executive council of nine members. There is also a legislative council of thirteen and a house of assembly of thirty members, both chosen by the people. There is an excellent educational system, the elementary schools being free. The island is supposed to have been discovered by Cabot. It was first colonized by France, captured by Britain in 1745, restored, and recaptured, and finally in 1873 was admitted to the Dominion of Canada. Pop. 1901, 103,258.

**Prince of Wales**, a British title, first conferred by Edward I on his son (afterward Edward II) at the time of his conquest of the Principality of Wales. Edward III was never Prince of Wales, but the title has been conferred on all the male heirs apparent to the English (and afterward the British) throne from Edward the Black Prince, son of Edward III. The heir apparent is made Prince of Wales and Earl of Chester by special creation and investiture, or by proclamation, but as the king's eldest son he is by inheritance Duke of Cornwall. As heir to the crown of Scotland the Prince of Wales bears the titles of Prince and High-steward of Scotland, Duke of Rothesay, Earl of Carrick, Baron of Renfrew, and Lord of the Isles, in virtue of an act of the Scottish parliament of 1469. The title of Earl of Dublin was also borne by Albert Edward when he was Prince of Wales.

**Princeton**, Bureau co., Ill. Railroad, C. B. & Q. Industries: carriage factory, flouring mill, and other small factories. Surrounding country agricultural. The town was first settled in 1834 and became a city in 1884. Pop. 1900, 6,041.

**Princeton**, Mercer co., N. J., 49 mi. s.w. of New York. Railroad, The Pennsylvania. It is a college town, being the seat of Princeton University, founded 1746, and Princeton Theological Seminary (Presbyterian). Pop. 1900, 3,899.

**Princeton University** (formerly the College of New Jersey), founded by the Presbyterian Synod of New York in 1746, and located at Princeton, N. J., in 1756. The first sessions were held in Elizabethtown. In 1848, the college was moved to Newark, where it remained until its permanent location at Princeton. Some of the most widely known of its early presidents were Jonathan Edwards, Aaron Burr and John Witherspoon. From its foundation the college ranked as one of the strongest educational institutions of the country, and by the middle of the 19th century it had risen to a position of great influence among colleges, and in the Presbyterian church. During the

## Printing

presidency of James McCosh (1868-1888) its endowment was increased over \$3,000,000, and great strides were made in the development of the institution, both materially and intellectually. On the 150th anniversary of its founding the College of New Jersey became Princeton University.

As now organized, Princeton University has scientific and academic courses of study requiring four years for completion, and graduate courses which constitute the university work in the various departments. The institution now (1904) has 32 buildings on its campus, 55 laboratories, a library of 176,302 volumes, besides special libraries connected with the laboratories, two astronomical observatories and museums of geology, archaeology, biology and history. The faculty numbers 108, and the enrollment is over 1,500. The president is Woodrow Wilson, LL.D., who succeeded Francis L. Patton in 1902. The university is non-sectarian.

**Printing** is the art of impressing characters upon paper, cloth, or other material. There has been much controversy over the origin of this comparatively modern invention which has made so great a change in civilization. We will endeavor to give only the principal facts leading up to the use of movable types together with the method of their use. It is said that in the year 175 the text of the Chinese classics was cut upon tablets, which were erected outside the university, and that impressions were taken of them. Some of these are still in existence. This is the first record of characters being reproduced. In China printing from wooden blocks can be traced as far back as the sixth century when the founder of the Suy dynasty had the remains of the classics engraved on wood. Printed books became common in the tenth century. The same methods have been used down to this time. A piece of pear tree wood is cut into pieces the size of two pages. One piece is squared, planed smooth, and varnished. The design is written on a thin, transparent paper and transferred to the block by rubbing. The engraver next cuts away all but the transferred letters which are left in relief. The block is then adjusted on a table in front of the printer, who has a bowl of blue ink on one side and a pile of paper on the other. In his right hand he holds a long stick with a flat brush on each end; with one brush he spreads on the ink, then lays the paper on with his left hand, passes the dry brush over it and the sheet is removed. It is said that Chinese printed from movable types of clay in the middle of the eleventh century. For a Chinese missionary office of to-day about 6,000 movable type characters are used, but for magazine work 10,000 are necessary.

In Japan block printing dates from 764-770, when the Empress Shyan-toka had a million toy pagodas each containing a rolled-up slip of paper 18 in. in length and 2 in. in width, printed with an extract from the Buddhist scriptures, and distributed among the temples

## Printing

and monasteries. There is a book in the British Museum printed in Korea from movable types in 1337. Koreans claim the invention of movable copper types in the beginning of the fifteenth century, and the books of that period show that such types were used. There is reason to suppose that William the Conqueror (1027-1087) and other kings of his time had their monograms cut on blocks of wood or metal in order to impress them on their charters. This is proved by the uniformity of impressions. The idea of multiplying impressions, however, was unknown to the ancients.

The progress of block printing is described under wood engraving, and we now come to the use of movable types. Up to 1499 it was universally believed that typography was invented at Strasburg by Gutenberg, who afterward set up an office at Mainz. Here Gutenberg issued a magnificent Latin Bible called the "Mazarin Bible" because it was discovered in Mazarin's library at Paris. Gutenberg's name does not appear on a single production of his press, and none of his associates mention his name as the inventor of printing. In an article published at Cologne in 1499 the writer says it all took place at Mainz about 1440, but crude specimens of the Donatuses exist which were printed some years before at Haarlem in Holland. These crude specimens, compared with the early work done at Mainz, which is highly finished, bear out the theory that printing was first done in Holland. On Nov. 6, 1455, a notarial instrument shows that Gutenberg had spent 1,600 guilders of his partner Faust's money, and Faust took possession of the office, and with Peter Schoeffer (afterward his son-in-law) continued the work. Gutenberg then formed a partnership with another capitalist and continued the work. With two rival offices in existence it was impossible to keep the process secret, and the art spread rapidly.

In 1476 or 1477 William Caxton introduced printing into England, setting up his office within the precincts of Westminster Abbey, but not within the building. In 1530 a censorship was established at the instance of the church, Cardinal Wolsey declaimed "against the act of printing, as that which would take down the honor and profit of the priesthood, by making the people as wise as they." The printers were oppressed, lost all social standing, and people who had English translations of the Bible, were burned at the stake or branded. In 1637 regulations were issued allowing but twenty masters of printing (who could print no books until the manuscript was submitted and licensed); four founders of letters, a vacancy to be filled by the seven commissioners (principally bishops); two apprentices to each master founder, and one other person to break off the knots of metal hanging to the end of the letters when first cast. Censorship was abandoned in 1694, and a period of revival began.

The first printing press in America was set up in 1536, by Antonio de Mendoza, viceroy of



Mexico, and in 1638 the first press in our country was established at Harvard College, the second at Philadelphia in 1685, and the third in New York in 1693.

The process of printing is as follows: The pages of type to be printed are locked up with iron or wedge-shaped boxwood blocks called quoins in a steel frame called a "chase." Books are usually printed in sheets of sixteen pages or multiples of sixteen, and when locked in the chase ready for printing it is called a form. The surface of the type is covered with ink by composition rollers which are made from a mixture of molasses, glue, glycerine, etc., boiled together and cast in brass molds. Balls made of skins were used up to 1813, when two Englishmen, Donkin and Bacon, made the first composition rollers, which facilitated the work of printing very much. Rollers of to-day are made practically of the same ingredients, although many pressmen add various balsams to give suction or prevent drying out. Rollers should never be washed until wanted for use, as the ink upon them prevents them from drying out. Several firms do a large business in manufacturing rollers, and have elaborate machinery by which the composition is forced into the molds from the bottom, preventing babbies and air holes.

The first printing press was made by Conrad Saspach, a turner, in 1436 under the direction of Gutenberg. John Dunius declared before the magistrates of Strasburg, in 1439, that he had received one hundred florins for work done at a press three years before. Gutenberg afterward remarked that the contemplation of a wine press gave him the first conception of a printing press. The essential feature of the first press was a movable flat board, platen, as now called. The form was laid upon a movable bed, inked with balls, the paper placed upon it and pushed under the platen which was brought down upon it by a powerful screw, squeezing the paper upon the form. In 1683, Moxon, the first technical writer on printing, speaks of a newly invented press, meaning the old wooden press improved by Blaen of Amsterdam. From this time until Earl Stanhope enlarged and improved the hand press about 1800, improvements were slow. The press of Clymer, of our country, called the Columbian and later the Washington, in which the impression screw was replaced by steel jaws which were brought together by pulling a lever, marks the principal advancement of the hand press. In 1772 a rotary press was patented in England by Adkin & Walker, for the purpose of "stamping and printing on paper, cotton, and other cloths, whereby the printing on such material would be greatly facilitated and rendered much less expensive and more perfect and exact." In 1790, William Nicholson, of London, editor of a scientific journal, took out a patent for a press, which foreshadowed nearly every fundamental principle in the improved presses of to-day, even to the use of curved plates fastened upon a cylinder, and the use of small form rollers

feeding from a large one. Nicholson never constructed a press, however, and his patent was merely a forecast of modern methods. The evolution of the printing press from the calico printing machine is often overlooked. In April, 1811, after many delays, 3,000 copies of Sheet H of the *New Annual Register for 1810, Principal Occurrences*, were printed from a "machine" (press) invented by Konig, and is the first part of a book so printed. The sheets G and Z of Clarkson's *Life of William Penn*, were worked off on a cylinder press, which, with the aid of two men, worked off 800 sheets within an hour.

The first newspaper printed by steam was *The Times*, of London, Nov. 28, 1814, published by John Walters. The inventor was Frederick Konig, a German printer, who reached London in 1806 and patented a platen press which was a failure. In 1811 he patented a cylinder press in which the bed moved to and fro. Mr. Walters was so struck with the possibilities of this method that he engaged Konig to build a double cylinder press which should print two copies of the paper on one side only. The machine was completed and the issue of the paper mentioned informed its readers that "they held in their hands one of the first newspapers printed by steam." The speed was 1,800 sheets an hour, printed on one side.

In 1818 Edward Cowper invented several improvements, including a flat ink distributing table, ink fountain, distributing and form rollers, and was employed to perfect Konig's press. In the same year Konig patented a perfecting press (by which both sides of the sheet was printed at the rate of 750 papers per hour). Cowper also improved on this. The principle of these presses was used for years with improved methods for carrying the sheets. Robert M. Hoe, the American inventor, made marked and practical improvements increasing the capacity of presses. Mr. Hoe, in 1847, made a rotary press which would print about 20,000 papers an hour on one side. Then the invention of William A. Bullock of Philadelphia, which printed complete from a roll or web, followed. This was improved on by Walters of London, but the Hoe presses soon distanced all, and to-day papers are printed, parted, folded, and counted at the delivery boxes at a speed of 48,000 per hour.

There are a number of other very fast and desirable presses on somewhat similar lines, including the Bullock, Scott, Potter, etc.

**Priscillian**, the founder of a sect in Spain, known as Priscillianists, in the middle of the fourth century, their doctrines being a mixture of Gnosticism and Manichæism. Priscillian was himself a wealthy and accomplished man, of very temperate and strenuous habits. His followers did not leave the Catholic Church, and he was actually at one time made a bishop himself. He was ultimately executed at Treves in 385, after a prolonged struggle with the orthodox clergy. The most distinctive part of his creed was the belief in an evil spirit as the supreme power.

**Prism**, in geometry, a solid figure which might be generated by the motion of a line kept parallel to itself, one extremity of it being carried round a rectilinear figure. A "right prism" is one in which the faces are at right angles to the ends. In optics a prism is a transparent body having two plane faces not-parallel to one another, and most commonly it is made of glass, and triangular in section, the section forming either a right-angled, equilateral, or isosceles triangle. The two latter varieties are most familiar.

**Prison**, a house in which a person is confined and thereby deprived of his personal liberty; especially a building for the confinement or safe custody of criminals, debtors, or others. Imprisonment is now one of the recognized methods of judicially punishing certain crimes; but formerly it was employed in nearly every country in Europe for purposes of injustice and oppression. Men were hidden in dark dungeons, where in a short time they perished, through the inefficiency of the law to protect those who were offensive to the powerful; and even in Great Britain, where the laws have always condemned the incarceration of the innocent, the prison was, by the connivance of the authorities, made subservient to gross injustice and cruelty. To the eighteenth century belongs the honor of initiating the proper regulation of imprisonment.

In the early part of the nineteenth century the most advanced examples of prison discipline and construction were to be found in the U. S., and although in the second half of the century this prominent position has not been maintained, the importance of the improvements initiated in America cannot be forgotten. Following closely on Howard's report, the Philadelphia Society for Assisting Distressed Prisoners was founded in 1776—the first of the kind in the world; and, though dissolved during the war, was reorganized in 1787, and is still at work. Large measures of reform were quickly secured; by 1790 the principle of separation was recognized, and in 1794 all convicts were separated and secluded; in the latter year, also, capital punishment was abolished in Pennsylvania for all crimes but murder in the first degree. It thus became necessary to devise some substitute for capital punishment. At the Eastern Penitentiary at Philadelphia, opened in 1829, the so-called "Pennsylvania System" of permanent seclusion of convicts was carried out; the evil effects arising from the rigorous application of this principle have been already referred to in this article, and even at Philadelphia the system is not now strictly enforced, while in all other American prisons what is known as the "Auburn System"—silent labor in association by day, and separation by night—has been adopted. In the Southern states prisoners are leased out to the highest bidders for the term of their sentences; but this system, which condemns the convicts to a slavery that is not modified even by considerations arising from personal ownership, is gradually being aban-

doned. The first place of detention for juvenile delinquents was opened at New York in 1825; the first reformatories on the cottage or family system were established in Ohio—for boys at Lancaster in 1858, for girls at Delaware in 1878. In 1877 the Elmira (N. Y.) Reformatory was opened, at which a now famous system has been adopted for the treatment of first offenders under thirty years of age; the principal features are indeterminate sentences, the classification of prisoners into three classes under the mark system, and discharge upon probationary parole, under supervision. The prisoners enjoy a luxurious dietary, and many indulgences are granted to induce them to work, so that the penal element of a sentence of imprisonment is entirely absent.

A grave defect alleged by American critics is that in the county jails and other places of detention for those waiting trial all such prisoners are compelled to associate in a common hall, with all the evils which follow as a necessary result. It is said also that politics to a large extent determine the selection of prison officials, many of whom are appointed simply for services rendered to their party; and that the interference of labor organizations has had a considerable effect in the direction of putting a stop to contract labor—in New York, to labor of any kind—in the prisons. It may be added that crime has increased in the U. S. in a ratio far in advance of the growth of population; in 1850 the prisoners represented 1 in 3,442 of the population; in 1880 they were 1 in 855.

**Prisoners of War** are persons captured from the enemy in time of war. In ancient times prisoners of war became the slaves of their captors, and even yet it is a recognized principle among nations that all the inhabitants of a vanquished town, state, or nation become the absolute property of the victors, though it is hardly necessary to say that the principle is now no longer acted upon by civilized nations. Prisoners of war are now generally either kept until the war is over, released on parole, or exchanged for prisoners taken by the other side.

**Prisrend'** (prisrendi), a town of European Turkey, in Albania, 80 mi. e. of Scutari. It is the residence of a pasha, and the seat of a Greek metropolitan and a Catholic bishop, and is one of the richest towns in Turkey, manufacturing large quantities of weapons, pottery, glass, etc. Pop. 39,000.

**Privateer**, a vessel of war owned and equipped by private individuals to seize or plunder the ships of an enemy. Such a vessel must be licensed by government and under a letter of marque, otherwise she is a pirate. In 1818 Congress passed a law forbidding enlistments on foreign privateers. By the Declaration of Paris, 1856, the great powers of Europe mutually agreed to abandon the right to arm privateers in case of war; but several nations, the chief ones being the U. S. and Spain, have not agreed to this, and it is doubtful whether it will be always strictly acted upon even by the parties to the declaration. The practise of privateering, while useful to maritime coun-

## Privy Council

tries, and necessary at one period to England, is very harassing to trade, and gives endless opportunities for private plunder.

**Privy Council**, the council of state of the British sovereign, convened to concert matters for the public service, and for the honor and safety of the realm. As it exists at present, the number of members of the privy council is indefinite; they are nominated by the sovereign at pleasure, and no patent or grant is necessary, but they must be natural born subjects. The list of privy councilors now embraces, besides the members of the royal family and the members of the cabinet, the archbishops and the bishop of London, the great officers of state, the lord chancellor and chief judges, the speaker of the House of Commons, the commander in chief; and other persons who fill or have filled responsible offices under the crown, as well as some who may not have filled any important office. Officially at the head is the lord president of the council, who is appointed by patent, and who manages the debates and reports results to the sovereign. A member of the privy council has the title of "right honorable." Privy councilors are by their oath bound to advise the crown without partiality, affection, or dread; to keep its counsel secret, to avoid corruption, and to assist in the execution of what is resolved upon.

**Privy Seal**, a seal appended by the British sovereign to such grants or documents as are afterward to pass the great seal. Since the time of Henry VIII the privy seal has been the warrant of the legality of grants from the crown, and the authority for the lord chancellor to affix the great seal; such grants are termed letters patent. The officer who has the custody of the privy seal is called lord privy seal, and is the fifth great officer of state, having also generally a seat in the cabinet.

**Proa**, a peculiar kind of sailing boat used in the Malay or Eastern Archipelago and the



Proa.

Pacific. It is variously constructed, but regularly has one side quite flat, on a line with the stem and stern, while the other side is curved in the usual way; and being equally sharp at stem and stern, it sails equally well in either direction without turning. Their shape and small breadth of beam would render them peculiarly liable to overset were it not for the outrigger they carry, adjusted sometimes to one side and

## Procedure

sometimes to both sides. The outrigger in the example here shown is a large structure supported by and formed of stout timbers. The outrigger may have weights placed on it and adjusted according to circumstances. Proas carry a lugsail generally of matting.

**Probate**, the proof before an officer authorized by law that an instrument offered to be proved or recorded is the last will and testament of the deceased person whose testamentary act it is alleged to be. In a trial at common law, or in equity, the probate of a will is not admissible as evidence, but the original will must be produced and proved the same as any other disputed instrument. This rule has been modified by statutes in some of the states. The proof of the will is a judicial proceeding, and the probate a judicial act. The party propounding the instrument is termed the proponent, and the party disputing, the contestant. In the U. S., generally speaking, proofs cannot be taken until citation or notice has been issued by the judges to all the parties interested to attend. On the return of the citation, the witnesses are examined, and the trial proceeds before the court. If the judge, when both parties have been heard, decides in favor of the will, he admits it to *probate*; if against the will, he rejects it, and pronounces the sentence of *intestacy*. The functions of this branch are confined to deciding on the authenticity of wills and upon the proper persons to act as administrators when no will exists. The practise of the court is thrown open to the whole legal profession.

**Probus**, MARCUS AURELIUS (232-282), one of the ablest of the Roman emperors, was b. at Sirmium. At an early age Marcus attracted the notice of the Emperor Valerian, by whom, after having distinguished himself by military service, he was placed at the head of a legion; and the brilliancy of his subsequent conduct in the African, Persian, Arabian, and Germanic campaigns, brought him into still more prominent notice. On the death of the Emperor Tacitus, in 276, the army hailed him as emperor, a selection immediately confirmed by the senate and people of Rome. His chief struggle during his reign was to guard the frontiers of the empire against the barbarians, a task which he carried out with great success both in Europe, Asia, and Africa. He also settled large numbers of barbarians in the frontier provinces, and admitted them to his legions, and devoted himself to the making of roads and draining of marshes. His skillful administration and public virtues did not, however, protect him from enmity; and after a short reign he was murdered in a military insurrection.

**Procedure**, CIVIL, is the method of proceeding in a civil suit throughout its various stages. In the U. S. when redress is sought for a civil injury, the injured party brings an *action* against the party whom he alleges has done the injury. The person who raises an action is termed the *plaintiff*, and he against whom the action is brought the *defendant*. It is usual before the suit is commenced for the plaintiff's



## Process

attorney to acquaint the defendant with the demand of his client, and state that unless complied with, legal proceedings will be instituted. Should this not have the desired effect, the action is begun as a rule by issuing against the defendant a *writ of summons*, commanding him to enter an *appearance* in court, failing which an appearance will be entered for him by the plaintiff. When an appearance has been entered both parties to the suit are now said to be *in court*, and judgment may be proceeded with. The next stage is the *pleadings* or the statements in legal form of the cause of action or ground of defense brought forward by the respective sides. The next stage of procedure after the pleadings is the *issue*, which may be either on matter of law, when it is called a *demurrer*, or on matter of fact, where the fact only is disputed. A demurrer is determined by the judges after hearing argument on both sides, but an issue of fact has to be investigated before a jury, and this is denominated *trial by jury*. After the judge has summed up to the jury the *verdict* follows and then the *judgment* of the court; where there is no jury, of course, judgment is pronounced by the judge after hearing counsel.

**Process**, in law, a term applied in its widest sense to the whole course of proceedings in a cause real or personal, civil or criminal.

**Proclamation**, a public notice made by a ruler or chief magistrate to the people, concerning any matter which he thinks fit to give notice about. In the U. S. the president issues proclamations as to treaties, days of thanksgiving, admission of new states, etc.

**Proclus** (412-485), a philosopher of the Neo-Platonic school, b. at Byzantium. He was educated at Alexandria and Athens and became familiar with all branches of philosophy and theology. As a teacher at Athens he was very successful. His system aimed at the widest comprehensiveness. He not only endeavored to unite all philosophical schemes, but made it a maxim that a philosopher should embrace also all religions by becoming infused with their spirit. In his writings he professes to return to Plato, and to bring down Neo-Platonism from the misty heights to which it was raised by Plotinus. M. Cousin placed him on a level with the most distinguished philosophers of Greece, but this estimate is generally considered extravagant. His extant works include a *Sketch of Astronomy*, in which he gave a short view of the systems of Hipparchus, Aristarchus, and Ptolemy; *The Theology of Plato*, *Principles of Theology*, a *Life of Homer*, etc.

**Procter**, BRYAN WALLER (1789-1874), an English poet and prose writer. His first published work was entitled *Dramatic Scenes and Other Poems*, and appeared in 1819 under the pseudonym of Barry Cornwall, which remained Procter's pseudonym in his future writing. This volume being well received, he published shortly thereafter *A Sicilian Story and Marcian Colonna*. In 1812 he produced a tragedy *Mirandola*, which was performed with great success at Covent Garden. Procter also wrote several other books of poetry and a variety of prose

## Progression

works; the most interesting of these latter being a *Memoir of Charles Lamb*, of whom he was an intimate personal friend. Procter's poems exhibit much delicate grace and refinement, but have never attained great popularity. He was called to the bar in 1831, and for many years held the post of a commissioner in lunacy, which, however, he resigned in 1860.

**Proctor**, RICHARD ANTHONY (1837-1888), English astronomer, b. at Chelsea, and educated at King's College, London, and Cambridge University. Having devoted himself specially to the study of astronomy, he published a number of valuable works on the subject, including *Saturn and its System*, *Hand-book of the Stars*, *Half Hours with the Telescope*, *Half Hours with the Stars*, *Other Worlds than Ours* (a very popular work), *Light Science for Leisure Hours*, *The Transits of Venus*, *The Cycloid and Cycloid Curves*, several *Star Atlases*, *The Universe of Stars*, *The Moon*, *Old and New Astronomy*, etc., besides two treatises on whist. He latterly resided a good deal in the U. S., where he died.

**Production**, COST OF, a phrase used in political economy, not always in the same sense even by the same writer. The confusion generally arises from a want of clearness in distinguishing between cost and expenses of production. The cost of production in its original meaning signifies the amount of inconveniences and exertions necessary for the production of any commodity. Used as equivalent to expenses of production, it signifies the wages and profits expended on the production of the article. It is the ultimate basis of value of articles which can be indefinitely multiplied, and regulates the minimum value of articles which are limited in quantity.

**Profit**, the gain resulting to the owner of capital from its employment in buying and selling, in manufacturing, or in any commercial undertaking. *Net profit* is the difference in favor of a seller between the selling price of commodities and the original cost after deducting all charges. The *rate of profit* is the proportion which the amount of profit derived from an undertaking bears to the capital employed in it. *Profit and loss*, the gain or loss arising from goods bought or sold, or from any other contingency. In *book keeping* both gains and losses are titled *profit and loss*, but the distinction is made by placing the former on the creditor side, and the latter on the debtor side.

**Prognath'ic** (or Prognathous), in ethnology, a term applied to the skull of certain races of men in whom the jaw slants forward by reason of the oblique insertion of the teeth. It is determined by the size of the facial or cranio-facial angle.

**Prognē** (Procnē). See *Philomela*.

**Progression**, in mathematics, a regular or proportional advance in increase or decrease of numbers. Continued *arithmetical progression* is when the terms increase or decrease by equal differences. Thus, 2, 4, 6, 8, 10, and 10, 8, 6, 4, 2, increase and decrease by the difference 2. *Geometrical progression* is when the terms increase or decrease in a certain con-

## Prohibition Party

stant ratio, as 2, 4, 8, 16, 32, 64, and 64, 32, 16, 8, 4, 2, which respectively increase and decrease by a continual multiplication or division by 2.

**Prohibition Party**, organized at Chicago, in 1869. Since 1884 it has forced action in nearly every state, on the question of license as applied to the liquor traffic. Full prohibition now exists in several of the states; partial in New Hampshire, and Vermont. In nineteen states prohibitory amendments to their constitutions have been submitted to vote—the aggregate vote in favor being 1,676,603; against 1,960,994.

**Projectiles**, THEORY OF, is that branch of mechanics which treats of the motion of bodies thrown or driven some distance by an impelling force, and whose progress is affected by gravity and the resistance of the air. The most common cases are the balls projected from cannon or other firearms. If thrown horizontally, the body will move in a curved path, because it retains unchanged (leaving out of account the resistance of the air) its horizontal velocity, while it falls faster and faster toward the ground. A body projected obliquely has initially a certain horizontal velocity and a certain vertical velocity. It retains its horizontal velocity unchanged, but its vertical velocity is altered by the force of gravity, and in both of these cases we find that the path of the projectile is a parabola. With a given velocity the greatest range of a projectile is obtained by projecting at an angle of  $45^\circ$  with the vertical. The actual path of the bullet is always within the parabola of the theoretical projectile, and hence the range of a gun is much less than what the parabola would give. The range depends also upon the shape and weight of the projectile, as well as upon the initial velocity.

**Prometheus**, in Greek mythology, one of the Titans, brother of Atlas and of Epimetheus, and the father of Deucalion. His name means "forethought," as that of his brother Epimetheus signifies "afterthought." He gained the enmity of Zeus by bringing fire from heaven to men, and by conferring other benefits on them. To punish this offense Zeus sent down Pandora, who brought all kinds of diseases into the world. He caused Prometheus himself to be chained by Hephæstus (Vulcan) on a rock of the Caucasus (the eastern extremity of the world, according to the notions of the earlier Greeks), where his liver, which was renewed every night, was torn by a vulture or an eagle. He was ultimately delivered by Hercules, who destroyed the vulture, unlocked the chains, and permitted Prometheus to return to Olympus. That is the tradition as shaped by Æschylus, who has a noble tragedy on the subject, the *Prometheus Vinculus* (Prometheus Bound), while Shelley has also a drama, the *Prometheus Unbound*. A different version is given by Hesiod.

**Promise**, in law, an engagement entered into by one person to perform or not perform some particular thing. When there is a mutual promise between two parties it is termed a contract. A promise may either be verbal

## Proofs

or written. A verbal promise is called a promise by parole, and a written promise is in technical language called a covenant. No promise is binding unless it was made for a consideration.

**Proof Impression**, in printing, a rough impression from types, taken for correction. A first proof is the impression taken with all the errors of workmanship. After this is corrected another impression is printed with more care to send to the author; this is termed a *clean proof*. When this is corrected by the author, and the types altered accordingly, another proof is taken and carefully read over; this is called the *press proof*. In engraving, a proof impression is one taken from an engraving to show the taste of it during the progress of the work; also, an early impression, or one of a limited number, taken before the letters to be inserted are engraved on the plate. Proof states of engravings are usually distinguished as 1, *Artists' proofs*, with no engraved title, sometimes signed in pencil by the painter or engraver, or both. *Remarque* artists' proofs have some mark, frequently a minute part left white, or a design slightly engraved on the margin. 2, *Proofs before Letters*, still without title, but with artists' and engravers' names inserted close to the bottom of the work, and the publisher's name near the lower margin of the plate. 3, *Lettered Proofs*, with title engraved lightly in such a manner as to be easily erased, or in open letters ready for shading, when the title is finally put on the plate for the ordinary impressions.

**Proofs, CORRECTION OF.** The corrections to be made on a "proof" of printed matter are marked on the margin; and for this purpose an established set of signs or shorthand is used. The following specimen of a proof exhibits the application of most of these signs:—

'To rule the nations with imperial  
sw<sup>φ</sup>y, to impose terms of peace, to <sup>1 a</sup>  
spare the humbled, and to crush the <sup>2 tr.</sup>  
proud, resigning itto others to de- <sup>3 #</sup>  
scribe the courses of the heavens, and <sup>4 |</sup>  
explain the rising stars; this, to use  
the words of the poet of the *Æneid* <sup>5 Italic.</sup>  
in the apostrophe of Anchises to  
Fabius in the Shades, was regarded <sup>6 ,/</sup>  
as the proper province of a Roman. <sup>7 S. caps.</sup>  
The genius of the people was ~~even~~ <sup>7 stel.</sup>  
more adverse to the cultivation of the <sup>8 9</sup>  
physical sciences than that the Euro- <sup>9 of</sup>  
pean Greeks, and [seen] we have] that <sup>6 ;/ 2 tr.</sup>  
the latter left experimental philosophy  
chiefly in the hands of the Asian and <sup>10 wf.</sup>  
African colonists. The elegant litera- <sup>6 ⊙</sup>  
ture and metaphysical speculations <sup>11 8</sup>  
of Athens, her histories, <sup>3</sup> dramas, <sup>2</sup> epics, <sup>1</sup> <sup>2 tr.</sup>

## Proofs

and orations, had a numerous host of admirers in Italy, but a *feeling* of indifference was displayed to the practical science of Alexandria. [This repugnance of the Roman mind at home to mathematics and physics, extending from the Atlantic to the Indian Ocean, from Northern Britain to the cataracts of the Nile, annihilated in a measure all pure sciences in the conquered districts where they had been pursued, and prohibited attention to them in the mother country.]

Long, indeed, after the age of Ptolemy, the school in connection with which he flourished, remained in existence; &c.

1, A wrong letter. After every mark of correction a line | should be drawn, to prevent its being confounded with any other in the same line. 2, A word or letter to be transposed. Where letters are to be transposed, it is better to strike them out, and write them in their proper sequence in the margin, like a correction. 3, A space wanted. This mark is used when the spacing is insufficient. 4, A space or quadrat *sticking up*. 5, Alteration of type. One line is drawn under the word for *italics*, two for SMALL CAPITALS, three for CAPITALS. 6, Correction or insertion of stops. 7, A word struck out, and afterward approved of (Lat. *stet*, "let it stand"). 8, A turned letter. 9, An omission. 10, A letter of a wrong font. 11, A word or letter to be deleted. 12, Alteration of type. 13, A new paragraph. 14, Insertion of a clause. 15, A space to be removed or diminished. 16, A wrong word. 17, When letters or lines do not stand even. 18, Mark for a hyphen. 19, No new paragraph. 20, The manner in which the apostrophe, inverted commas, the star and other references, and superior or "cock up" letters and figures are marked.

The immediate object of a "reader" or corrector of the press is to observe and mark every error and oversight of the compositor, with a view to make the printed sheet a perfect copy of the author's manuscript. This is on the supposition that the manuscript itself is quite correct, which is seldom the case; and therefore the duty of a good reader extends to seeing that there are no inconsistencies in orthography, punctuation, abbreviations, etc., and in many cases to the verification of quotations, dates, and proper names. Where extensive alterations, omissions, or additions are likely to be made by writer or editor, it is more convenient to take the proofs on long slips, before division into pages. The making of new paragraphs, or the suppression of those

## Prophets

in type, should be avoided as causing trouble and expense.

The duty of securing consistency in spelling and punctuation is especially important in the case of works on which several writers are employed, such as newspapers and cyclopedias. The corrector has also to direct his attention to the numbering of the pages; to the arrangement of chapters, paragraphs, and notes; to running titles, etc. It is part of his business to observe the mechanical defects of the work, defective types, turned letters, inequalities of spacing between words, sentences, and lines, crooked lines, and to secure symmetry in verses, tables, mathematical operations, and such like. In almost all cases two proofs are taken, and in difficult works, such as those in foreign languages, tables, etc., even more. Lastly follows the revision, in which little more is done than seeing that the compositor has made all the corrections marked on the last proof. It is usual for the writer or author to reserve the correction of the second proof for himself.

The thankless and monotonous business of a corrector or reader is more difficult than the uninitiated would believe. It requires extensive and varied knowledge, accurate acquaintance with the art of typography, and, above all, a peculiar sharpness of eye, which, without losing the sense and connection of the whole, takes in at the same time each separate word and letter.

**Prophets**, among the Hebrews, inspired teachers sent by God to declare his purposes to his people. From the time of Samuel frequent mention is made of a body of men bearing the general name of prophets. They were members of a school in which young men of all the tribes were instructed in the law, and apparently also in sacred poetry and music. The first school of this nature appears to have been set up by Samuel at Ramah, and there is mention of others at Bethel, Jericho, Gilgal, and elsewhere. It is probable that these schools of the prophets were formed to strengthen the attachment of the Jews to their religion, and to maintain that religion pure. The prophetic order seems to have continued in existence down to the close of the Old Testament canon. Sixteen of them are the writers of books that are admitted into the Old Testament canon. These may be divided into four groups in such a manner as to give us a partial chronological arrangement. First, there are three prophets who belong to the kingdom of Israel as distinct from that of Judah—Hosea, Amos, Jonah; secondly, there are eight prophets of the kingdom of Judah—Joel, Isaiah, Jeremiah, Obadiah, Micah, Nahum, Habakkuk, Zephaniah, thirdly, two prophets of the captivity—Ezekiel and Daniel; and fourthly, three prophets of the return—Haggai, Zechariah, and Malachi. To the first group belong also Elijah and Elisha, the two great prophets, who are not the authors of any books in the canon. The chief function of the prophetic order was to maintain the Mosaic theocracy in its purity, and the patriotism which strongly characterizes all the Hebrew



## Prose

prophets was closely connected with their religious zeal. The Jewish people being the chosen of God and the immediate subjects of the divine ruler, it is the constant cry of the prophets that the people should turn to righteousness in order to be delivered from the hands of their enemies. The predictive powers of the prophets have been the occasion of much controversy. The ability of the prophets to foretell the future was generally believed in by the Jews.

**Prose**, ordinary spoken or written language, untrammelled by poetic measure, and thus used in contradistinction to *verse* or *poetry*. The true character of prose can be clearly conceived only by considering it in relation to poetry. The two chief states of the inward man may be called the *thinking* and the *poetical* states, and depend upon the predominance of the understanding, or the imagination and feelings. If we think (in the narrower sense of the word) we combine ideas according to the laws of reason; and prose, which is the language of sober thought, is characterized by the abstractness and precision belonging to ideas that occupy the understanding. Artistic and finished prose is among the latest attainments both of nations and individuals, and it would appear that with most nations classical prose writers are fewer than classical poets.

**Prosecution** (Criminal).—The American law differs from that of other countries in having no office analogous to what is termed in France *ministère public* for the prosecution of offenses. At common law, therefore, and in the great majority of cases, the so-called *prosecutor* is merely the person injured by an offense, who in the first instance obtains a summons or warrant against the accused. The result of this is that many criminals are allowed to go free merely for want of a prosecutor.

**Pros'ody**, that part of grammar which treats of the quantity of syllables, of accent, and of the laws of versification. Though chiefly restricted to versification, it may also be extended to prose composition. In the Greek and Latin languages every syllable had its determinate length or quantity, and verses were constructed by systems of recurring feet, each foot containing a definite number of syllables, possessing a certain quantity and arrangement. The versification of modern European languages, in general, is regulated mainly by accent and number of syllables, though the weight or quantity of syllables has also to be taken into account if harmonious verse is to be produced.

**Protag'oras**, a Grecian philosopher, b. at Abdera, in Thrace, apparently about 480 B.C. He was the first to assume the title of Sophist, and as such he taught principally at Athens. In 411 B.C. he was accused of atheism, for beginning one of his works (*Peri Theon*—"Concerning the Gods") with the words, "Respecting the gods, I am unable to know whether they exist or do not exist." He seems to have died soon after, perhaps in the same year. He was the author of a large number of works, all of which are lost.

## Protogene

**Protection**, applied in economics to an artificial advantage conferred by a government or legislature on articles of home productions, either by means of bounties or (more commonly) by duties imposed on the same or similar articles introduced from abroad. Such duties may be simply *protective*, that is, such as that the foreign and home articles can compete in the market on nearly equal terms; or *prohibitory*, that is, such as to exclude foreign competition altogether. See *Tariff*.

**Pro'teids**, a name given to substances analogous in composition to protein, that is, consisting of carbon, hydrogen, oxygen, and nitrogen, sometimes united with sulphur and phosphorus. The gluten of flour, albumin, the fibrin of the blood, syntonin, which is the chief constituent of muscle and flesh, and casein are examples of proteids. Proteids are the essential food stuffs.

**Pro'tein**, a hypothetical principle of food, obtained from animal or vegetable albumin, fibrin, or casein, which are all considered to be modifications of it.

**Protest'**, a formal declaration by the holder of a bill of exchange or promissory note, or by a notary public at his request, that acceptance or payment has been refused, and that the holder intends to recover all the expenses to which he may be put in consequence thereof.

**Protestants**, a name given to the party who adhered to Luther during the Reformation in 1529, and protested, or made a solemn declaration of dissent from a decree of the emperor Charles V and the diet of Spire, and appealed to a general council. The protesting members were the electors John of Saxony and George of Brandenburg, Princes Ernest and Francis of Brunswick-Lüneburg, Philip, landgrave of Hesse, and Wolfgang, prince of Anhalt, together with fourteen imperial cities, the chief of which were Strasburg, Nürnberg, Ulm, and Constance. The name is now applied generally to those Christian denominations that differ from the Church of Rome, and that sprang from the Reformation.

**Pro'teus**, in classical mythology, a marine deity who fed the flocks (seals) of Poseidon (Neptune) in the Ægean Sea. He is represented as a soothsayer who prophesied only when compelled by force and art, and who tried every means to elude those who consulted him, and changed himself, after the manner of the sea gods, into beasts, trees, and even into fire and water.

**Protococ'cus**, a genus of algæ. *P. nivālis* (red snow) appears on the surface of snow, tingeing extensive tracts in the Arctic regions or among the Alps, in an incredibly short space of time, with a deep crimson. This plant, which may be regarded as one of the simplest forms of vegetation, consists of a little bag or membrane forming a cell. A large number of these are commonly found together, but each one is separate from the rest, and is to be regarded as a distinct individual.

**Pro'togene**, (-jēn), a species of granite composed of feldspar, quartz, mica, and talc or

## Protophytes

chlorite, so called because it was supposed to have been the first formed granite. It occurs abundantly in the Alps of Savoy, and is found in Cornwall, where, on decomposition, it yields china clay or porcelain earth.

**Protophytes**, a name given to the lowest organisms in the vegetable kingdom, consisting either of a single cell, or of several cells united by a gelatinous substance, but without any essential mutual dependence, and corresponding to the Protozoa of the animal kingdom.

**Protoplasm**, a substance consisting of carbon, oxygen, nitrogen, and hydrogen, nearly identical with the white of an egg, and constituting the most elementary living matter in animal and plant structures. It is colorless, transparent, and apparently destitute of structure, and is seen in its simplest form in some of the lowest types of animal life, as in the Protozoa. When unrestricted by an imprisoning envelope it is endowed with the power of extending itself in all directions in the form of mutable processes which can be withdrawn spontaneously, and it has also the power of passing or flowing in minute masses through closed membranes without these masses thereby losing their identity of form. In the form of cells, the skin of which is merely dead and hardened protoplasm, and inclosing a nucleus, or with a nucleus embedded in its substance, it is the structural unit of all organized bodies, constituting not only the basis of the ovum of both plants and animals, but of the tissues themselves in their perfect state, which are mere multiples of such cell-units variously modified. The nucleus is believed by some to be doubtful, and due to imperfection in the glass. As the protoplasm in our bodies is continually undergoing waste, a continuous renewal of the material is essential to the continuance of life. Animals, however, cannot elaborate protoplasm from mineral substances for themselves, they being able only to convert by the process of digestion dead protoplasm into living. Plants can, on the other hand, manufacture protoplasm from mineral compounds and the atmosphere, and so they are the storehouse of protoplasmic matter for the animal kingdom. Some biologists prefer the term *Bioplasm* to that of *Protoplasm*, as being more expressive of its function. *Sarcod* is also used similarly.

**Proudhon** (prô-dôn), PIERRE JOSEPH (1809-1865), a French publicist, b. at Besançon. At the age of nineteen he entered a printer's office, afterward became a press reader, and in this way acquired considerable linguistic knowledge, with the result that he wrote an *Essai de Grammaire Générale*. As a reward for his studious labors, he had conferred on him by the Academy of Besançon, the *pension Suard*, which yielded him an income of 1,500 francs for three years. Political economy now became his chief study, and in 1840 appeared his famous work, bearing on the title-page the question, "What is property?" to which the first page of the treatise contains the answer, "It is theft." For this treatise, and two others that followed, he was prosecuted at Besançon,

## Provincetown

but was ultimately acquitted. In 1843 he managed a system of water transport on the Rhône and Saône; settled in Paris in 1847; started various newspapers, and became a leader in the revolution of 1848; was elected a representative for the Seine in the Constituent Assembly; attempted with no success to found a *Banque du Peuple*; and for his outspokenness in the press he was imprisoned for three years.

**Provençal Language and Literature**, strictly the language and literature of that portion of Southern France known as Provence, but in its widest application the Provençal language includes the Romance form of speech belonging to the inhabitants of a geographical area which comprises the whole south of France. This language was the earliest cultivated of the Romance languages (or those based on the Latin), and at one time was extensively used in literature. Provençal, as a new and distinct language, appears in historical records about the tenth century, and continued as a medium of living literary expression until about the end of the thirteenth century. In 1350 a few scholars of Toulouse attempted to revive its decaying glory, and for this purpose composed a treatise on grammar and poetry. About the middle of the fifteenth century the language ceased to be used both for administrative and literary purposes, and it has long been reduced almost to the condition of a *patois*. In the present century such poets as Jasmin and Minstral have endeavored to resuscitate Provençal as a literary language, and have produced poems of no small value written in the modern form of it; while a society of literary men and scholars exists for the purpose of furthering this object. Still Provençal is a language whose interest as a vehicle of literature is mainly in the past.

**Proverbs**, one of the canonical books of the Old Testament, usually in the main ascribed to Solomon. According to modern Biblical critics the book of Proverbs is composed of several sections written by different authors and at different times, and finally collected into a single book at some period subsequent to the return from the captivity.

**Providence**, Providence co., R. I., metropolis and state capital, at the head of navigation of Narragansett Bay. Railroad, New York, New Haven & Hartford. It is a port of entry, and the second largest city in New England. Seat of Brown University (Baptist), founded in 1764, the Dexter Asylum for the poor, Butler Hospital for the insane, etc. It is one of the great manufacturing centers of the country. It ranks first in the United States in the manufacture of jewelry, has extensive silver works, shoe and corset factories, steam engine works, stove, locomotive, cigar, cotton, woolen, worsted goods and hosiery factories. Pop. 1900, 175,597.

**Provincetown**, Barnstable co., Mass., on Provincetown Harbor, 120 mi. from Boston. Railroads: N. Y., N. H. & H., and Old Colony. Steamboat connection with Boston. Industries, manufacturing. First landing place of the

## Prune

Pilgrims in the Mayflower, 1620. Birthplace of Peregrine White, first English child b. in New England. The town was first settled about 1700. Pop. 1900, 4,247.

**Prune**, any variety of plum which can be cured without removing the stone. Prunes are cured in three ways: by sun drying, by evaporation through fire heat, and by cooking before drying. The output of the United States in 1900 was about 100,000,000 lbs. See *Plum*.

**Pruning** is the severing of portions of the stem, branches, shoots, leaves, or roots of a plant for the purpose of removing excrescent or unprofitable growths, and rendering the sap more conducive to the nutrition of the valuable parts of the plant. The immediate effect of pruning is to reduce the growth of a plant in as far as it depends on the amount of foliage duly exposed to the light; but as by judicious pruning the parts left have not only a greater share of sap, but are better exposed to the light, its ultimate effect is to produce a larger and stronger plant. From the tendency of sap to flow in increased quantity into the parts immediately adjoining those where its flow has been interrupted, an almost unlimited power is given to the gardener of controlling the direction of the growth of a plant. The season for pruning varies with the nature of the tree and the purpose for which it is pruned. In general it may be said that autumn or winter is the best season for extensive pruning; in summer an excess of vigor in the plant may require a little pruning, but in spring it not only weakens the plant but is liable to induce disease. *Root pruning* is employed to check rapidity of growth and to induce development of flower buds. The best season for this operation is after the leaves have fallen in autumn, or before the sap begins to flow in spring.

**Prussia** (German, Preussen), KINGDOM OF, the leading state of the German Empire, comprising the greater part of Northern and Eastern Germany, and part of Western Germany, divided in the following provinces: East Prussia, West Prussia, Brandenburg, Pomerania, Posen, Silesia, Saxony, Sleswick-Holstein, Hanover, Westphalia, Hesse-Nassau, Rhineland, Hohenzollern. The average density of the population is 256 to the English sq. mi.; being an increase at the rate of 76 per cent. per annum during the previous five years. The Protestants number 18,244,400, or more than 64 per cent.; the Roman Catholics, 9,620,000, or nearly 34 per cent. The capital and largest town is Berlin. Other large towns are Breslau, Cologne, Magdeburg, Frankfurt, Königsberg, Hanover, Düsseldorf, Danzig. The great bulk of the inhabitants are of the German race, but about 3,500,000 are non-German, including 2,000,000 Poles and 400,000 Jews. Pop. 1901, 34,463,377.

*Agriculture, etc.*—The land in Prussia is much subdivided, especially in the more populous districts, small farms of 3 or 4 acres being the most common holding. In East and West Prussia the soil is for the most part poor; the Rhine valley and the province of Saxony may be considered the most productive portions of

## Prussia

the kingdom. Rye is the chief agricultural product, oats are largely grown in the northeast, wheat chiefly in the south and west, while the other grain crops are spelt (an inferior sort of wheat), maize, millet, and barley. Potatoes are extensively cultivated, beet-root for the production of sugar is a very important crop; flax, hemp, and rape seed cover large areas; tobacco is raised in several provinces; and in the Rhine and Moselle districts the vine is freely cultivated and some of the finest wines produced. In East Prussia horses are reared chiefly for military purposes; cattle are largely exported from the maritime provinces, and in West Prussia and Pomerania sheep are raised in large numbers. Along the Baltic and the North Sea a considerable number of the inhabitants are employed in the fishing industry. The forests cover about 23 per cent. of the total area, and are a great source of wealth, forestry being nowhere better understood than in Prussia. The best wooded provinces are Brandenburg, Silesia, and Rhenish Prussia. In some of the forests the wild boar is common, other wild animals being the wolf, lynx, wild-cat, etc.

*Mining and Manufactures.*—Mining is one of the chief branches of Prussian industry; the most important mineral products being coal and lignite, iron, copper, lead, silver, and zinc, while other minerals produced to a greater or less extent are cobalt, nickel, arsenic, antimony, manganese, rock salt, kainit, and other potash salts, alum, and copperas. The manufacture of porcelain and the finer kinds of ware is extensive, and leather and paper making are large industries. Other manufactures of national importance are beet-root sugar, chocolate, chicory, chemical products, and tobacco.

*Trade and Commerce.*—Prussia carries on a large trade both by sea and with its inland neighbors. The principal exports are textile fabrics, yarn, metals, and metal wares, agricultural produce and live stock, wool, chemicals, spirits, coal, timber, leather, stoneware and glass, etc.; and the imports are chiefly in the raw materials connected with the textile and other manufactures, and tea, coffee, and sugar, and other colonial products. Besides the ordinary road and canal communication, Prussia has an extensive system of railways (15,000 miles) which in time will become wholly national property. The principal ports are Memel, Pillau, Königsberg, Danzig, Stettin, Stralsund, Kiel, and Flensburg on the Baltic; and Altona on the North Sea. In some of these ports, and particularly Stettin, shipbuilding is carried on with considerable activity. The system of money, weights, and measures is the same as that of the rest of Germany.

*Government, Administration, etc.*—Prussia is a monarchy, hereditary in the male line, the present constitution of which was framed by the government, with the aid of the constituent assembly, in 1850, and subsequently modified by royal decrees. The king is assisted in the executive by an irresponsible privy council and by a cabinet which is nominally responsible to a legislative assembly composed of two



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chambers. The upper chamber (Herrenhaus) is composed of princes of the blood of the reigning and former sovereign families of full age, the heads of the mediatised principalities, the territorial nobility created by the king, life peers chosen by the king, and a few titled nobility elected by resident land owners, etc. The second chamber, or House of Deputies (Haus der Abgeordneten), since the enlargement of the kingdom, consists of 432 members, being 1 to every 66,000 of the population. The primary qualification of electors is based on taxation, and the primary electors are divided into three classes. The first division consists of those who pay the highest taxation, the second who pay the medium, and the third of those who pay the lowest amounts. The indirect electors (Urwähler) elect the direct electors (Wahlmänner), who choose the representatives. The deputies are chosen for three years. The annual revenue and expenditure usually amount each to about \$350,000,000, while the total national debt (1891) is \$1,109,384,127. The principal items of revenue are direct taxes, state railways, domains, and forests. For local administrative purposes the kingdom is divided into provinces, governmental departments, circles, and communes, and all recent legislation has tended to reinforce local authority and discourage centralization. At the head of each province is a president or governor and also a military commandant. Prussia is by far the most important state in the German Empire, to the Bundesrath or Federal Council of which it sends 17 members, while to the Reichstag or Diet it sends 236 deputies (more than half the total number). Although the reigning family and nearly two thirds of the total population are Protestant, absolute religious liberty is guaranteed by the constitution. The clergy, both Protestant and Roman Catholic, are paid by the state. A complete system of primary, secondary, and university education exists, all grades of schools being linked together according to a definite scheme or schemes of study. Elementary education is enforced by law, maintained by local taxes, and administered by local authority. Prussia has ten universities—Berlin, Bonn, Breslau, Göttingen, Griefswald, Halle, Keil, Königsberg, Marburg, and Münster, attended by some 15,000 students in all. All private as well as public educational establishments are placed under the superintendence of the minister of public instruction, and all public teachers are regarded as servants of the state. The Prussian army and navy form an integral part of those of Germany in general.

*History.*—The historical development of the Prussian Kingdom is closely associated with three important elements. The first of these is found in the growing power of the electorate of Brandenburg, which formed the nucleus of the future kingdom; the second relates to the acquirement of the province of Prussia, which gave its name to the new heterogeneous territory; and the third is associated with the rule of the Hohenzollern family, under whose skillful diplomatic and military

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guidance the small Brandenburg electorate has grown into what is now considerably the larger portion of the German Empire. The Prussians were a Slavonic people inhabiting the coast territory situated between the Vistula and the Niemen. Their neighbors, the Poles, endeavored to convert them to Christianity, and to this end they (1283) conquered the whole country with the aid of the Teutonic Knights of St. George. As the price of this assistance the knights claimed the conquered territory, and established themselves in castles and walled cities. Their rule, which was a despotic oligarchy, was finally overturned by the combined forces of the Prussians and the Poles, and in 1466 West Prussia was ceded to Poland and East Prussia made a fief of the Polish crown under a grand master, and latterly under a duke.

John Sigismund was succeeded in 1619 by his son George William, who was unequal to encounter the terrible crisis that now occurred in the affairs of Germany, the Thirty Years' War. During this war the electorate became the battle ground of the contending forces, and suffered severely, being at the death of the elector in 1640 occupied by the Swedish troops. Frederick William, called the Great Elector, may be regarded as the virtual founder of the Prussian monarchy. Dying in 1688 he was succeeded by his son Frederick; who in 1701 had himself crowned as king, being the first King of Prussia. Frederick I was succeeded by his son Frederick William I, who governed Prussia till 1740. His reign was on the whole peaceful, and the country grew greatly in population, industry, and wealth. He went to war with Charles XII, and acquired part of Pomerania, with Stettin, from Sweden.

Frederick II, surnamed the Great, succeeded to the crown on the death of his father, in 1740. In less than a year after his accession he proclaimed war against Maria Theresa in order to enforce his claim to the Silesian principalities, and invaded Silesia. At the persuasion of England Maria Theresa entered into negotiations with him, but failed at first to come to an understanding. Ultimately, however, by a treaty concluded at Berlin (1742) Frederick obtained the cession, with the exception of some specified districts, of both Upper and Lower Silesia, and of Glatz. Conceiving that the Austrians might seek to regain this territory, Frederick, in 1744, invaded Bohemia, and commenced what is called the Second Silesian War. He was at first compelled to retreat, but subsequently gained such successes that when peace was concluded in 1745 Austria confirmed the cession of Silesia, which was guaranteed by Great Britain. Frederick invaded Saxony, entered Dresden, and published the despatches which proved the enmity of France and Russia. England now openly entered into a defensive alliance with Frederick, and subsidized him. The allies, whose plans had been discovered, Austria, France, Russia, and Sweden, prepared for immediate hostilities. In the Seven Years' War following upon this movement, the immense

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forces which his enemies were able to bring into the field reduced Frederick to the greatest straits, and gave opportunity for the development of his strategic genius. The peace of Hubertsburg (1763) put an end to the war, which had transformed Prussia into one of the chief European powers. Frederick determining again to extend his boundaries, entered into an alliance with Austria, and invaded the territories of Poland. Negotiations followed with Russia, and in 1772 the partition of Poland was arranged in a treaty between the three powers. In this way Prussia obtained most of Pomerania and a large portion of Poland. Frederick d. in 1786, and was succeeded by his nephew, Frederick William II. In 1788 he made a useless armed intervention in the affairs of Holland, and in 1791 interfered in the affairs of France on behalf of Louis XVI. In 1792, war having already been declared by the French authorities against the empire, the Prussians, under the duke of Brunswick, invaded France. They were defeated by Kellerman at Valmy, and soon afterward Frederick William withdrew from this war with France, in which he had been the most active promoter. Then followed a second and a third partition of Poland (1793, 1795), by which Prussia acquired a considerable accession of territory. By the treaty of Basel, concluded in 1795 with the French Republic, Prussia openly abandoned her connection with the other European powers. Frederick William d. in 1797, and was succeeded by Frederick William III. Continuing his father's policy in regard to France, he courted the French directorate, and at the peace of Lunéville (1801) Prussia was indemnified by 4,116 sq. mi. ceded at the expense of the empire. In 1804 Prussia recognized Napoleon as emperor of France, and in the campaign which ended in the overthrow of Austria at Austerlitz (1805) remained neutral. This attitude was at first successful, but ultimately it led to distrust among the German states, and by the formation of the Confederation of the Rhine Prussia was isolated and left to the mercy of Napoleon. At the instigation of the latter Prussia had occupied Hanover. Frederick William declared war against France without an ally. Although the Prussian army numbered 180,000 men, the French emperor was able to put a larger force in the field. On Oct. 14, 1806, the armies met at Jena and Auerstädt, where the Prussians were completely defeated, and the whole country was soon in the hands of Napoleon. At the peace of Tilsit (June, 1807), concluded between Prussia and Napoleon, all lands between the Rhine and the Elbe were ceded to Napoleon. The years which followed were chiefly remarkable for the sweeping internal reforms which the crisis necessitated, carried out under Baron Stein and Baron Hardenberg, and almost amounting to a revolution. The restriction of the army to 42,000 was evaded by replacing rapidly the drilled men by another body of undrilled men. Thus, after Napoleon's disastrous Russian campaign of 1812, Prussia was prepared to take prompt advantage of her op-

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portunity. The king issued a general call to arms, and 150,000 men at once responded. A treaty with Russia was concluded at Kalisch, and the league thus formed was joined afterward by Austria. In the great struggle for the overthrow of Napoleon, which followed an important part, was taken by the kingdom of Prussia. At the Congress of Vienna (1815), when the map of Europe was rearranged, Prussia, though losing some possessions, was indemnified with others more extensive and valuable, and was placed in a more advantageous position than before. She now also formed one of the states in the new German Confederacy.

After the Restoration Frederick William III leaned to the despotic counsels of Austria and Russia, supported heartily the Holy Alliance, and entered upon a reactionary policy which continued until his death in 1840. He was succeeded by Frederick William IV. In 1847 he tried to anticipate the revolutionary movement spreading throughout Europe by summoning a combined meeting of provincial parliaments at Berlin, but he conferred on them no real power. In the following year the king dismissed his ministers, and granted a constitution, the details of which were elaborated by a new parliament, and which was formally proclaimed in 1850. The Poles in 1848 revolted against Prussian rule, but the movement was summarily suppressed. In 1857, the king being unable to conduct affairs by reason of mental illness, his brother William became regent, and ultimately succeeded to the throne on the death of Frederick William in 1861.

At this time, on the complaint of the Federal Diet that Denmark had not observed its treaty obligations in regard to the duchies of Schleswig and Holstein, the Prussians, under General Wrangel, entered Schleswig (1864), and Denmark was overpowered. By the Treaty of Vienna Denmark gave up Schleswig, Holstein, part of Jutland, and Lauenburg to Germany. In the following year Prussia purchased the claims of Austria over the duchy of Lauenburg, and it was agreed that Schleswig and Holstein should be administered separately by both powers. Prussia, which had determined on appropriating them, wished to buy out Austria, but the latter would not cede her claims for money. This led to war between the two powers and to the break-up of the German Confederation, some of the states of which sided with Prussia, others with Austria. On June 15, 1866, the Prussian troops took the offensive, and the brief campaign which ensued is known as the Seven Weeks' War. After the war Prussia incorporated Hanover, Hesse-Cassel, Nassau, Hesse-Homburg, Schleswig, Holstein, Lauenburg, Hesse-Darmstadt north of the Main, and the principality of Hohenzollern, which already belonged to the royal family. The king of Prussia now invited the states of North Germany to form a new confederation, which was established on the basis of proposals made by Prussia. In 1870 Prince Leopold of Hohenzollern consented to become

## Prussic Acid

a candidate for the then vacant Spanish throne. This was opposed by the French emperor, who demanded not only that the candidate should withdraw, but that the king of Prussia should pledge himself not to permit any such future candidature. This being refused, war was declared by France (1870), with a most disastrous result to herself. After the German arms had proved entirely successful, the king of Prussia assumed in 1871, the title of German Emperor.

From this point the history of Prussia is, to a great extent, merged in that of the German Empire. In the hands of Prince Bismarck, acting as premier of Prussia as well as chancellor of the empire, a strong, central, autocratic government has been maintained. See *Germany*.

**Prussic Acid**, called also *hydrocyanic* or *cyanhydric acid*, was discovered by Scheele in 1782, but first prepared in the pure state by Gay-Lussac in 1811. It is a colorless liquid which solidifies at 5° F. to feathery crystals, and boils at 80°. Its specific gravity is about 0.7. It dissolves in all proportions in water, forming a liquid which reddens litmus paper but slightly. It is found in the kernels of bitter almonds, peaches, apricots, plums, cherries, and quinces; the blossom of peaches, aloes, etc.; the leaves of the beech, cherry, laurel; and various parts of other plants. Pure prussic acid is prepared by passing a stream of dry sulphureted hydrogen over dry cyanide of mercury. This acid, which is one of the strongest poisons known, is used medicinally to remove various forms of irritation; but in all cases it must be used with extreme caution. When an overdose is administered death is instantaneous, and with a lesser dose the symptoms are convulsions or paralysis. The nature of its action is not clearly understood, but the best antidotes are found to be ammonia, chlorine water, or a subcutaneous injection of atropine.

**Psalms**, Book of, one of the books of the Old Testament, containing the liturgical collection of hymns used by the Jews in the temple service. Each psalm in the collection, with a few exceptions, has a particular superscription, such as *Maschil*, instruction, *Michtam*, memorial, etc. The chronology of the psalms is much disputed. The earliest is said to have been written by Moses, many are attributed to David, a few are supposed to have been written on the return from the captivity, and some are assigned to the time of the Maccabees.

**Psalttery** (or Psalterion), an instrument of music used by the Hebrews, the form of which is not now known. That which is now used is a flat instrument in the form of a trapezium or triangle truncated at the top, strung with thirteen chords of wire, mounted on two bridges at the sides, and struck with a plectrum or crooked stick, thus resembling the dulcimer (which see).

**Psammetichus** (sam-met'i-kus), a king of Egypt who d. about 617 B. C. He was one of the twelve kings who reigned simultaneously in Egypt for fifteen years after the expulsion

## Psychology

of the Ethiopian dynasty; but being suspected by the other kings of aiming at sole sovereignty he was driven into banishment. With the aid of some Greek mercenaries, however, he defeated the other kings in a battle fought at Momemphis, on the east side of Lake Mareotis, after which he became the sole king of Egypt (671 or 670 B. C.), and the founder of a new dynasty.

**Psara** (or Ipsara) (*Psyra*), an island of Turkey, in the Grecian Archipelago, 7 mi. n.w. of Scio, about 5½ mi. in length, and as many in breadth.

**Psyche** (sī'kē), a sort of mythical or allegorical personification of the human soul, a beautiful maiden, whose charming story is given by the Latin writer Appuleius. She was so beautiful as to be taken for Venus herself. This goddess, becoming jealous of her rival charms, ordered Cupid or Love to inspire her with love for some contemptible wretch. But Cupid fell in love with her himself. Many were the trials Psyche underwent, arising partly from her own indiscretion, and partly from the hatred of Venus, with whom, however, a reconciliation was ultimately effected. Psyche by Jupiter's command became immortal, and was forever united with her beloved.

**Psychology** may be briefly defined as the science of mental phenomena. After having long occupied a doubtful place as a department of metaphysics, supplemented by many empirical observations, its character as a science dealing with a special order of facts, and many of the laws of occurrence of these facts, may now be said to be established. At the same time opinion is still far from unanimous on many of the most important points of psychological doctrine, especially on such points as involve a philosophical view of the nature of mind.

**Mental "Faculties."**—The observation and description of mental facts have led to a classification of them, according to their degrees of likeness, into certain orders; and these have been frequently spoken of as different powers or functions of the mind. In the earliest stage of psychological inquiry we even have them described as different parts of the soul. In this way Plato distinguishes desire, anger, and reason, and locates them in the lower part of the body, in the heart, and in the brain respectively. But the classification which had most influence upon subsequent writers was Aristotle's. His distinction of thought and desire is the origin of the dual classification of intellectual and active powers (each with many subdivisions) which was for long almost unanimously adopted. A tripartite classification—Cognition, Feeling, and Desire or Will—was put forward by the psychologists of Kant's time, accepted by Kant, and since his time has been very generally adopted. The value of such classifications is easily, and has often been, overestimated. In the first place, it is clear that, although such functions or faculties may be distinguished, they do not operate apart from one another. No concrete state of mind consists merely of knowl-



edge or merely of will; nor can it be properly called by one of these names, except as a means of describing it by its most prominent characteristic. In the second place, it has to be borne in mind that it is no explanation of a mental fact to refer it to a mental faculty. To maintain, as Kant, Hamilton, and Lotze did, that there are certain fundamental conscious functions or conscious elements which cannot be reduced to some single function or element, gives no real support to the view which seems to underlie much of the "faculty psychology"—the view that mind is a congeries of distinct faculties, and psychology a process of labeling facts and putting each into its proper compartment. To refer phenomena to memory, generalization, etc., as their causes is to mistake a name for an explanation.

The "faculty psychology" described and demolished by the English Associationists and by Herbart is, however, rather a mode of thought into which certain writers have frequently lapsed than a method which they have consciously adopted and defended. And the quest for a simple and uniform mental element from which all the wealth of conscious life has been derived is not therefore successful, because the faculty psychology is unsuccessful. Herbart regards the interaction of presentations as accounting for all mental phenomena; in a similar way Spencer seeks to derive mind from a succession of somethings which can only be described as analogous to nervous shocks. But the difficulty of both is to pass from this objective element to the feeling of pleasure or pain, aptly described by Hamilton as subjectively subjective, or to the phenomena of Volition. Accordingly, many psychologists who are at one with Herbart and the Associationists in rejecting the conception of faculties as a mode of explaining facts yet hold that the final analysis we can reach of consciousness or of mental phenomena does not enable us to derive subjective feeling (of pleasure or pain) from presentation, or activity from either, the three elements being involved in the simplest state of consciousness (the term "consciousness," as distinguished from "self-consciousness," being here used as a quite general term for any mental state).

*Attention.*—Many of the most important controversies of psychology center in the question of the nature and extent of the activity involved in consciousness. In its simplest form this activity is seen in the subjective reaction involved in apprehending a presentation; in its most developed form it is the act of will which determines a course of conduct upon which momentous issues are known to hang. In the latter case, as well as in the former, the critical point is the direction of Attention. Now attention is generally allowed not to be a special "faculty," or separate activity different from the elements of consciousness already described. It is simply consciousness regarded as active and as concentrated on some portion of its objective content, whereby the intensity of that portion is increased. The point in dis-

pute is chiefly whether this active concentration is ultimately determined by the strength of external factors. It is clear that the direction of attention is conditioned by the previous mental groupings of ideas. Further, attention involves a muscular adjustment—at any rate when directed to objects of sense, and also (although in a less marked degree) when directed to a train of thought. These facts are differently interpreted. On the one hand, Bain, Ribot, and others, find the basis of attention in the muscular adjustment; on the other hand, the muscular adjustment is looked upon as the organic expression and development of subjective activity; and this subjective activity is held to be involved in the simplest state of consciousness. The one view looks upon the external as determining and even somehow producing the internal. According to the other view the process is one in which a subjective or spiritual factor expresses itself through and gradually extends its control over an organic and physical environment.

*Sensation.*—Sensations are commonly defined as the simple mental states which result from nervous stimuli. This physiological reference enables us to distinguish the Special Senses, with their clearly defined organs adapted to the reception of different kinds of external stimuli, from Organic or General Sensibility, which arises from the state of the internal organs of the body (such as the alimentary canal, the lungs, and the heart), and from the Motor Sensations. These last (which play so important a part in the development of knowledge) are due to the central excitation of a motor or efferent nerve, and the consequent contraction of the muscle in which it terminates. The sensation both modifies and is modified by the conscious state into which it enters. We have no experience, and can form no valid conception, of the mere sensation. For the subject which experiences it, it is merely an element in a complex and ever-changing whole. This is a point which has been commonly overlooked by the Associationist psychologists. They started with a succession of disconnected mental molecules, called sensations, and attempted to trace the growth of mental life from their combination. But this is to begin with an abstraction. The earliest stage of mental life would rather seem to be a vague manifold into which distinction is just being brought; and the growth of knowledge consists not only in the addition of new elements, but in drawing new lines of distinction and forming new groupings of elements. And these distinctions and groupings may be said to be determined by the varying intensities of different elements in the changing mental content, or by the continuous redistribution of attention.

*Ideation.*—The mental content thus varies in the distinctness of its parts, which may even disappear from consciousness and afterward reappear. This reinstatement in consciousness is called Representation or Ideation, and the represented or ideal contents are called Images. The circumstances determin-

ing the succession of ideas and formation of images are, first, new sense-impressions; secondly, voluntary direction of attention; and thirdly, the mutual influence of the mental elements. It is the last of these which is referred to under the title of Laws of Association. In the article *Association of Ideas* an account is given of the way in which one concrete experience recalls another. In every case of association a twofold process would seem to be involved. A portion of the present mental content coalesces with a resembling portion of a past mental state, and the revival of this portion involves the reinstatement in consciousness of the other elements with which it was previously connected. The latter, which is the properly reproductive process, is thus due to the fact that consciousness is not a collection of atomic sensations, but a continuous whole.

*Perception* is the knowledge by means of sensation of an individual object or thing. The nucleus of the percept is thus one or more present sensations which coalesce with revived or ideal elements belonging to the same sense, and combine with revived or ideal elements belonging to other senses. These presentative and representative elements are bound together and presented as a single mental content, which we refer to a portion of the body or to a thing in space beyond the body, and to which we ascribe qualities corresponding to our sensations. In brief, Perception, as distinguished from Sensation, involves, first, complexity of elements; secondly, localization; and thirdly, individualization and objectification. The complexity consists of the elements of present sensation, and of the ideal group with which the former coalesce or combine. The localization clearly involves the perception of space. The individualization and objectification may be accounted for by the following considerations: (a) The various sensations grouped together in a percept—e.g., the resistance, touch, color, taste, smell of an orange—are so related that modification of one of them commonly involves modification of the others. Thus they come to be perceived as a group. (b) Not only are motor sensations involved in fixing attention on other sensations, but the greatest distinctness of the other sensations is commonly accompanied by conditions which admit also of sensations of touch and resistance. Hence the object comes to be experienced as offering resistance or as an *obstacle*. (c) In this way the other sensations come to suggest touch and resistance, and thus to be referred to a thing in space which offers resistance to our muscular energy. This forms the psychological basis of the distinction between primary and secondary qualities of matter.

The above account traces the perception of objects in so far as it is mainly dependent upon active touch, i. e., touch plus its attendant motor sensations. To active sight—i. e., sight plus its attendant motor sensations—a perception is due which differs from the preceding (a) in the absence of the sensation of resistance;

so that we do not derive from active sight alone a knowledge of objects outside of and opposed to our own bodies, and our apparently direct perception of distance, solidity, etc., by sight is really a derived perception; (b) in the vastly greater number of elements simultaneously presented, so that the simultaneity of perception which characterizes the developed perception of space is mainly due to visual perception.

*Space and Time.*—As the preceding paragraph points out, objects or things are perceived as in space. Similarly, our conscious life is apprehended as a succession, i. e., as in time. The whole of our experience may thus be said to be conditioned by Space and Time; the phenomena of external perception by space, those of internal perception by time. The two spheres are sometimes described as the object world and the subject world respectively. Regarding both space and time there are several questions which admit of being kept distinct. First of all, there is the question as to their reality—are they real existences, or simply modes of our subjective perception? This is a question which properly lies outside psychology, and belongs to metaphysics. Then there is the question of the way in which we form concepts of space and time. Geometry depends upon such a conception of space. The points, lines, and surfaces of geometry are not percepts, but abstractions from perception, formed as other concepts are formed. What then is that in perception from which we are able to form concepts of space and time? It must itself be a spatial or temporal percept. It is then with regard to the perceptions of space and time that the most difficult psychological question enters. And the question regarding both perceptions is affected by the secular controversy concerning the existence and the function of an *a priori* factor in mind.

Thus we start with two opposed views of the perception of space: first, the Intuitive or Nativist theory, according to which space is an innate idea (or, as since Kant it has more commonly been put, is the form in which we perceive objects), and is not derived from sensations, but is a form of perceiving, belonging *a priori* to the mind, and contributed by it in the production of experience; secondly, the Empirical theory, according to which space is the worked-up product of sensations. The universal and necessary character of the spatial perception has been brought forward in defense of the former theory. But it is important to remember that certain sensations—odors, tastes, and even sound—are localized only indirectly, as belonging to a visible or tangible object. Sensations both of movement and resistance accompany touch; and sensations of movement accompany sight to an extent which is not nearly equaled in the other senses. In addition to this, however, we must take account of what Lotze calls the "local signs" which belong to tactual and visual sensations. These local signs are due to the extended nature of the sense organs of sight and touch, and are

elements in sensation by which sensations arising from the stimulation of different portions of the retina (or of the skin) are distinguished from one another. The simultaneous distinctness in sensation which is due to these "local signs" is gradually interrupted by motor sensations, and out of these elements there gradually emerges the perception of one's own body, by relation to which other things are localized in space. Thus, although the perception of space is implied in that of body, the two perceptions grow to clearness together.

The perception of time seems a simpler question than the other because we are apt to confuse the succession of presentations on which it is based with a presentation of succession, which, of course, would be a presentation of time. The elements from which this presentation of time is derived may be somewhat as follows: When a number of presentations are successively presented, each grows fainter as attention passes from it, and hence arises a vague distinction between present and not present. Afterward, on the same series being repeated, the second member will be rising in intensity when the first is presented, and therefore in full intensity; when the second is presented, the first will be sinking in intensity, while attention will be passing on toward the third, whose intensity will therefore be rising; and so on throughout the series. Hence the vague distinction of present and not present becomes more definite as a distinction of past, present, and future, and this is the presentation of time.

*Memory and Expectation.*—Both of these are distinguished from the mere succession of ideas and images by involving a reference to one's own conscious life as a succession in time. When an image is remembered its various parts have a fixed order and position, it is accompanied by a number of attendant or accessory ideas, and it is recognized as belonging to one's past self. The expected image has not always the same fixed position or number of attendant ideas; but it, too, is referred to self, one's future self, and it is characterized by an element of striving or tension and by an increasing degree of intensity. The phenomena of memory and expectation are a recognized difficulty for the theory which seeks to derive mind from the succession of presentations.

*Thought.*—In the process of thinking different mental contents are related together, generalized into notions or concepts, discriminated, and, in the higher forms of thought, arranged in an orderly manner under some scientific or other ideal. Thinking is further distinguished from perception and imagination by dealing with classes of things rather than particular objects, and by being mainly voluntary, whereas perceptions are mainly automatic. But the distinction is not an absolute one. In imagination and even in perception a process of voluntary selection may be involved, and every clear perception involves a conception of a class to which the object is referred. Further, the relating process which is characteristic of thinking may be found, though in

a less explicit manner, involved in perception: for the percept has been shown to consist of a variety of elements connected together in definite ways. Carrying the analysis further, we can find no conscious content without such relations. This has been commonly brought out by emphasizing the necessity of difference for consciousness.

Relations are involved in all consciousness equally with elements related. "Feelings" and "relations between feelings" (to use Mr. Spencer's terminology) must be regarded as equally ultimate in mind. The Associationists made consciousness begin with separate units of sensation or "feeling;" and those writers who have received and carry on the tradition of the Associationists have devoted much attention to determining the nature of these relations. But if the ultimate datum of consciousness is not separate atoms of presentation, and if the growth of mind consists not merely in additions to a *continuum*, but in drawing new lines of distinction and connection within it, we may see how neither the so-called "feeling" nor the so-called "relation between feelings" is independent and conceivable by itself, and how both are simply abstractions from the state of mind which, even at its simplest, is a concrete phenomenon. In other words, what is characteristic of thought as well as what is characteristic of sensation is involved in all consciousness.

*Feeling and Emotions.*—The term *feeling* is of very ambiguous significance in psychology. But there is a pretty general agreement to use it for the second of the three elements in the tripartite division of mind (although, unfortunately, it has not been restricted to that use). The psychology of feeling has two problems to deal with: first, to determine the nature and conditions of pleasure and pain, as contrasted with other elements of mental life; and secondly, to analyze into their elements, and trace the growth of, the complex feelings or emotions. The emotions are complex states of mind in which a feeling of pleasure or pain is predominant. This feeling is connected, more or less distinctly, with a presented or ideal object, and is complicated with elements of organic sensation, and, usually, with tendencies to action or elements of desire. These complex states of feeling, or emotions, take their various forms, according to the elements of which they are composed, and their mode of origin. The classification of the emotions and the nature and origin of such emotions as sympathy and the moral sentiment are still vexed questions of psychology.

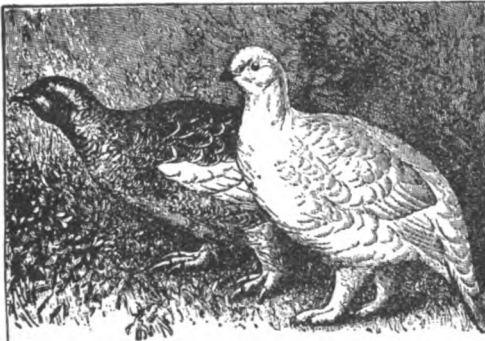
*Desire and Volition.*—In these phenomena we have the development of the active element in mind complicated with feeling and manifesting itself in muscular activity. Writers who regard this active element as ultimately due to the play of merely presented or external factors have attempted to derive volition from spontaneous movement (Bain) or from reflex action, factors which enter consciousness merely as motor presentations. As opposed to this we have the view that the fundamental



## Ptarmigan

act of *Will* is the direction of attention to certain ideal elements or groups. Whether this direction of attention is itself determined solely by pleasure and pain is a question which has raised more controversy than perhaps any other question in psychology. In Desire there is present the conception of an object or ideal end, accompanied by feeling and by an element of striving. Normally, when the conception of the end has been associated with definite means to its realization, the desire is followed by a volition or act of will. The development of volition is a process of growing complexity and definiteness. Beginning with the act of attention, the power of will is gradually extended over the bodily movements controlled by muscles in connection with the motor nerves. Movements which are at first random, reflex, instinctive, or merely expressional, are brought within its operation. Further, will grows side by side with reason and imagination, is called into operation not by sense-presentation only, but in response to images and concepts, and can thus be regulated by reason. A double tendency is at work in this development: the associative and automatic tendency of acts frequently repeated to become habitual; and the intellectual tendency by which ends and the acts tending toward them are brought into rational order. In this way the individual comes to act for permanent ends and from fixed principles, and to develop a definite character.

**Ptarmigan** (târ'-), a bird of the grouse family (Tetraonidae), distinguished from the true grouse by having the toes as well as the tarsi feathered. The common ptarmigan (called



Common Ptarmigan—summer and winter plumage.

also *white grouse*) is the *Lagopus vulgāris*. The male is about 15 in. long, the female about an inch less. In summer the predominant colors of its plumage are speckled black, brown, or gray, but in winter the male becomes nearly pure white, and the female entirely so. The willow ptarmigan or willow grouse occurs in great abundance in the arctic regions of America and in Norway.

**Pterodactyl** ("winged finger"), a genus of extinct flying reptiles of the order Pterosauria, found in the Jura Limestone formation in the Lias at Lyme-Regis, in the Oolite slate of Stone-

## Ptolemy

field, etc. The pterodactyls had a moderately long neck, and a large head. The jaws armed with equal and pointed teeth; most of the bones, like those of birds, were "pneumatic," that is, hollow and filled with air; but the chief character consisted in the excessive elongation of the outer digit (or little finger) of the fore-foot, which served to support a flying membrane. A number of species have been discovered, most of them small or of moderate size, but one must have had an expanse of wing of at least 20 ft.

**Pthah** (or Phtha), an ancient Egyptian divinity, the creator of all things and source of life, and as such father and sovereign of the gods. He was worshiped chiefly at Memphis under the figure of a mummy-shaped male, and also as a pygmy god.

**Ptol'emy** (Ptolemaios), the name of a line of Græco-Egyptian kings, who succeeded, on the division of the empire of Alexander the Great, to the portion of his dominions of which Egypt was the head. They were also distinguished by the surname Lagidæ, from Ptolemæus Lagus, the founder of the dynasty. **PTOLEMY I**, called *Soter*, the Savior, was by birth a Macedonian. On the death of Alexander he attached himself to the party of Perdiccas, and secured for himself the government of Egypt. In 308 he invaded Greece, and proclaimed himself as a liberator; but he made little progress, and having garrisoned Corinth and Sicily, which he lost some years later, he returned to Egypt. He was a great patron of art, learning, and literature, and founded the celebrated Alexandrian library. **PTOLEMY II** succeeded his father, and reigned in almost complete peace. His chief care as ruler was directed to the internal administration of his kingdom. **PTOLEMY III**, surnamed *Euergetes* (the benefactor), was early engaged in an important war against Syria, which having invaded he advanced without opposition to Antioch, then turned eastward subduing Mesopotamia, Babylonia, etc. The fleets of Ptolemy had at the same time subdued the coasts of Asia Minor, and carried his arms to the Hellespont and to the coast of Thrace. Ptolemy took some part in the affairs of Greece against the rulers of Macedonia, and maintained friendly relations with Rome. **PTOLEMY IV**, surnamed *Philopator*. His Syrian possessions having been gradually wrested from him by Antiochus the Great, Ptolemy put himself at the head of a large army and completely defeated Antiochus at Raphia, in B. C. 217. **PTOLEMY V** (surnamed *Epiphanes*), his son and successor, was under five years old at his father's death, and this led Philip of Macedon and Antiochus III (the Great) of Syria to combine to dispossess Ptolemy, and divide his dominions. To avert this danger the guardians of the young king placed him under the protection of Rome, which thus had first an occasion for interfering in the affairs of Egypt. **PTOLEMY VI** (surnamed *Philometor*) was a child at the death of his father. His reign was much disturbed by the rivalry of a brother, and being expelled from Alexandria he repaired

## Ptolemy

to Rome B. C. 164, by whose intervention he was replaced. During the reigns of the succeeding Ptolemies the influence of the Romans in Egypt gradually increased, with a corresponding decrease in the independence of the native sovereigns. PTOLEMY XII reigned jointly with his sister Cleopatra till B. C. 48, when Cleopatra was expelled, and raising an army in Syria invaded Egypt. On the arrival of Cæsar, Cleopatra by her charms acquired an ascendancy over him. Ptolemy put himself at the head of the insurgents, was defeated by Cæsar, and drowned in attempting to make his escape. PTOLEMY XIII, the youngest son of Ptolemy XI, was declared king by Cæsar in conjunction with his sister Cleopatra B. C. 47.

**Ptolemy** (CLAUDIUS PTOLEMÆUS), a Greek astronomer and geographer of the second century after Christ. He appears to have resided in Alexandria, where he made astronomical observations in 139, and he was alive in 161. Ptolemy's great astronomical work is entitled *Megalē Syntaxis tēs Astronomias*, and is more commonly known by the Arabic title *Almagest*. His system, founded on the apparent movements of the heavenly bodies, and which is still known by his name, was only superseded by that of Copernicus.

**Public Health Acts**, certain acts of Congress regulating sanitary matters. In this country scientific investigation into the means for preserving health is of recent growth, although laws were early enacted by the colonies for the prevention of the introduction of contagious or infectious diseases from foreign ports. State boards of health have been created in at least thirty-five states. In 1878 Congress passed "An Act to prevent the introduction of contagious or infectious diseases in the U. S.," providing that no vessel coming from a foreign port where contagious or infectious disease may exist shall enter any port of the U. S., except in a manner prescribed by regulations. In 1879 a National Board of Health was created by Congress; its duties were to obtain information upon all matters affecting public health, and to advise the several departments of the government and the executives of the several states on all questions submitted by them. Town or city boards of health have existed for many years in all the large cities, authorized by public health acts of legislatures.

**Public Schools**, the schools established under any national system of education. In the U. S. their administration, organization, and support depend upon the state legislatures. Boards of education in many states have special charge of the schools. Three grades are commonly recognized—the primary, grammar, and high. Normal schools for the training of teachers are established in nearly all the states.

**Pub'lius Syrus**, Latin writer, so called because a native of Syria, was carried as a slave to Rome about the middle of the first century B. C. His master gave him a good education, and afterward set him free. He excelled in writing *mimi*, or farces, which were inter-

## Pufendorf

persed with moral sentences, and a collection of them was used by the Romans as a school-book. A number of apothegms, not all of them composed by him, have been published as *Publii Syri Sententia*.

**Pueb'la** (in full, La Puebla de los Angeles), the capital of a Mexican state of the same name, situated on a plateau 76 mi. s.e. of Mexico. It has spacious streets and solidly built houses, the cathedral being a magnificent structure. It contains a large number of religious edifices, many of them highly decorated. There are also several colleges, a museum, and a theater. It is one of the chief seats of Mexican manufacturing industry, and its chief products are cotton and woolen goods, leather, glass, earthenware, and soap. Puebla was built by the Spaniards in 1533-34. Pop. 75,000. The state consists of an elevated plateau, and contains much fertile soil. On the western frontier is the volcano of Popocatepetl, the highest mountain in Mexico. Area 12,042 sq. mi.; pop. 839,468.

**Pueblo Indians** are semi-civilized Indians of the Western states, in New Mexico, and Arizona, some 8,278 in number, living in villages, in communal houses (a number of families together), and possessed of considerable skill in agriculture and the simpler kinds of manufacture. Their village communities are self-governed.

**Pueblo**, Pueblo co., Colo., on Arkansas River, 45 mi. s. of Colorado Springs. Railroads: Denver & Rio Grande; Denver & New Orleans; A. T. & S. F.; and C. R. I. & P. Industries: silver smelting works, one being the largest in the world, iron and steel works, mining machinery, and flour mills. It is the commercial center of Southern Colorado and is located in a rich mining district. The state agricultural society and state insane asylum are located here. Pop. 1900, 28,157.

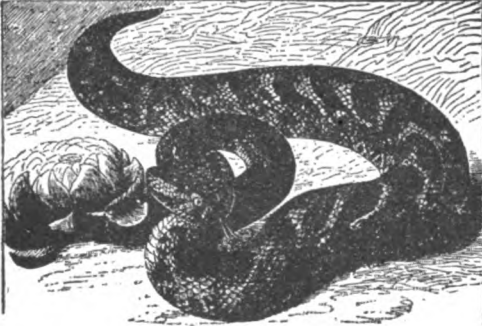
**Puerto-prin'cipe**, an old town in the interior of Cuba, early in the century the seat of the central government and supreme courts of justice of the Spanish West Indies. Its chief manufacture is cigars. It is connected by railway with its port, San Fernando de Nuevitas. Pop. 46,641.

**Pu'fendorf** (or Puf'fendorf), SAMUEL, BARON VON (1632-1694), German writer on the law of nature and nations. In 1661 he became professor of the law of nature and of nations at Heidelberg. In 1677 he published his work *De Statu Reipublicæ Germanicæ*, which, from the boldness of its attacks on the constitution of the German Empire, caused a profound sensation. In 1670 he went to Sweden, became professor of natural law in the University of Lund, and brought out his chief work, *De Jure Naturæ et Gentium*, and in 1675 an abstract of it, *De Officio Hominis et Civis*. In 1677 Pufendorf went to Stockholm as historiographer-royal. There he wrote in Latin his vigorous vindication of Protestantism, *On the Spiritual Monarchy of the Pope*, a *History of Sweden from the Campaign of Gustavus Adolphus in Germany to the Abdication of Queen Christina*, a *History of Charles Gustavus*, and in German his *Intro-*

## Puff Adder

duction to the *History of the Principal States of Europe*. In 1686 he received a summons to Berlin from Frederick William, elector of Brandenburg, a history of whom Pufendorf wrote for his son, the first king of Prussia. In 1694 he was created a baron by the king of Sweden, and in the same year he d. at Berlin.

**Puff Adder** (or *Vipera* or *Clotho arietans*), a serpent found in South and Central Africa. Its popular name is derived from its power of puffing out the upper part of the neck when



Puff Adder.

irritated or alarmed. It is very thick, attains a length of 4 or 5 ft, and is extremely venomous. The Bosjesmen poison their arrows with its venom.

**Puffin**, the name for the marine diving birds of the genus *Fratercula*. The common puffin (*F. arctica*) is a native of the arctic and northern temperate regions. It can fly with great rapidity when once upon the wing. It is about a foot in length, and from the singular shape and enormous size of its bill, which is striped with orange upon bluish gray, is often called



Puffin.

the sea parrot or the coultier-neb. Their plumage is glossy black, with the exception of the cheeks and under surfaces, which are white. It breeds upon rocks and in the rabbit warrens near the sea, and lays one egg, which is white. It lives on fish, crustacea, and insects, and is a gregarious and migratory bird.

## Pulley

**Pug Dog**, a small dog which bears a miniature resemblance to a bull dog, and is only kept as a pet.

**Puget Sound** (pū'jet), an inlet on the northwest coast of state of Washington, forming the southwest continuation of Juan de Fuca Strait, with which it is connected by Admiralty Inlet. On its shores are Seattle, Olympia, and other towns.

**Pug Mill**, a machine for mixing and tempering clay. It consists of a hollow iron cylinder, generally set upright, with a revolving shaft in the line of its axis, carrying a number of knives projecting from it at right angles, and arranged in a spiral manner. The clay is thrown in at the top of the cylinder, and by the revolution of the shaft is brought within the action of the knives, by which it is cut and kneaded in its downward progress, and finally forced out through a hole in the bottom.

**Pultzer, JOSEPH**, b. in Hungary in 1847. Early in life he came to America and began work on the *Westliche Post*, in St. Louis, under Carl Schurz. He was elected to the Missouri Legislature in 1869, and in 1874 was a member of the State Constitutional Convention. In 1884 he was elected a member of Congress. He founded the *St. Louis Post Dispatch* in 1878, and purchased the *New York World* in 1883. In 1903 he founded a school of journalism at Columbia University.

**Pulley**, a small wheel movable about an axle, and having a groove cut in its circumference over which a cord passes. The axle is supported by a kind of case or box called the *block*, which may either be movable or fixed to a firm support. The pulley is one of the six simple machines or mechanical powers, and is used for raising weights. A single pulley serves merely to change the direction of motion, but several of them may be combined in various ways, by which a mechanical advantage or purchase is gained, greater or less, according to their number and the mode of combination. The advantage gained by any combination or system of pulleys is readily computed by comparing the velocity of the weight raised with that of the moving power, according to the principle of virtual velocities. The friction, however, in the pulley is great, particularly when many of them are combined together. A pulley is said to be fixed when the block in which it turns is fixed, and it is said to be movable when the block is movable. In the single fixed pulley there is no mechanical advantage, the power and weight being equal. It may be considered as a lever of the first kind with equal arms. In the single movable pulley where the cords are parallel there is a mechanical advantage, there being an equilibrium when the power is to the weight as 1 to 2. It may be considered as a lever of the second kind, in which the distance of the power from the fulcrum is double that of the weight from the fulcrum. In a system of pulleys in which the same string passes round any number of pulleys, and the parts of it between the pulleys are parallel, there is an equilibrium when the power is to the weight



## Pullman

as one to the number of strings at the lower block. In a system in which each pulley hangs by a separate cord and the strings are parallel, there is an equilibrium when the power is to the weight as 1 to that power of 2 whose index is the number of movable pulleys. Whatever be the mechanical arrangement of the pulleys and of the ropes the principle of all pulleys is the same, namely, the transmission of the tension of a rope without sensible diminution so as to obviate the loss of force consequent on rigidity. The term pulley is used indifferently to denote either a single sheave or the complete block and its sheaves. In machinery a pulley is a wheel, generally with a nearly flat face, which being placed upon a shaft transmits power to or from the different parts of the machinery, or changes the direction of motion by means of a belt or band which runs over it.

**Pullman**, GEORGE M., inventor, b. in Chautauqua co., N. Y., 1831. At twenty-two he contracted for removing warehouses on the Erie canal; afterward in Chicago raising entire blocks of brick and stone buildings. In 1859 made his first sleeping car, now developed into the car known all over the world—especially adapted for sleeping in, or as a drawing room or dining car. The industrial town of Pullman was founded by him, to improve the social surroundings of his workmen. D. 1897.

**Pulque** (pul'kă) (or Octli), a favorite drink in Mexico and Central America, made from the juice of various species of agave, pleasant and harmless until after protracted fermentation, when it becomes an intoxicant. A kind of brandy is also distilled from it.

**Pulsometer**, an instrument of the pump kind for raising water, especially when that liquid is mixed with solid matter. It acts by the condensation of waste steam sent into a reservoir, the water rushing up into the vacuum formed by the condensation.

**Pumice**, a substance frequently ejected from volcanoes, of various colors, gray, white, reddish brown, or black; hard, rough, and porous; specifically lighter than water, and resembling the slag produced in an iron furnace. Pumice is really a loose, spongy, froth-like lava. It contains 75 parts silica and 17 alumina, with some iron, lime, soda, etc., and the pores being generally in parallel rows, it seems to have a fibrous structure. Pumice is of three kinds, glassy, common, and porphyritic. It is used for polishing ivory, wood, marble, metals, glass, etc.; also for smoothing the surfaces of skins and parchment.

**Pump**, a contrivance for raising liquids or for removing gases from vessels. The air pump is dealt with in a separate article. Though the forms under which the hydraulic pump is constructed, and the mode in which the power is applied, may be modified in a great variety of ways, there are only four which can be considered as differing from each other in principle. These are the *sucking* or *suction pump*, the *lift pump*, the *force pump*, and the *rotary* or *centrifugal pump*. Of these the suction or common household pump is

## Pump

most in use, and for ordinary purposes the most convenient. A piston is fitted to work air-tight within a hollow cylinder or barrel; it is moved up and down by a handle connected with the piston rod, and is provided with a valve opening upward. At the bottom of the barrel is another valve, also opening upward, and which covers the orifice of a tube called the suction tube, fixed to the bottom of the barrel, and reaching to the bottom of the well from which the water is to be raised. When the piston is drawn up from the bottom of the barrel the air below is rarefied, and the pressure of the external air acting on the surface of the water in the well, causes the water to rise in the suction tube until the equilibrium is restored. After a few strokes the water will get into the barrel, the air below the piston having escaped through the piston-valve. By continuing, the water will get above the piston and be raised along with it to the cistern, at the top of the barrel, where it is discharged by a spout. The *lift pump* has also two valves and a piston, both opening upward; but the valve in the cylinder instead of being placed at the bottom of the cylinder is placed in the body of it, and at the height where the water is intended to be delivered. The bottom of the pump is thrust into the well a considerable way, and the piston being supposed to be at the bottom, as its valve opens upward there will be no obstruction to the water rising in the cylinder to its height in the well. When the piston is drawn up its valve will shut, and the water in the cylinder will be lifted up; the valve in the barrel will be opened, and the water will pass through it and cannot return as the valve opens upward; another stroke of the piston repeats the same process, and in this way the water is raised from the well; but the height to which it may be raised is not in this as in the suction pump limited to 32 or 33 ft. The *force pump* differs from both of these in having its piston solid, or without a valve, and also in having a side pipe with a valve opening outward, through which the water is forced to any height required, or against any pressure that may oppose it. In such pumps the *plunger* or solid piston is frequently employed instead of the ordinary piston. The plunger works air-tight through a stuffing-box at the top of the barrel, and on being raised produces a vacuum in the pump barrel into which the water rushes by the pipe, and is discharged, on the descent of the plunger through the pipe, the valves serving to intercept the return of the water at each stroke. The side pipe, however, requires the addition of an air vessel. "Double-acting" pumps are often employed for household purposes. Centrifugal pumps are universally employed wherever the lift is not too great, and the quantity of water is considerable. A wheel, shaped like an ordinary fan, has passages leading from its center to its circumference; it is made to rotate very rapidly in a casing. Its circumference communicates with a delivery pipe, and its center with a pipe leading to the water which is to be pumped. The rapid revolution

## Pumpkin

of the wheel causes by centrifugal action a constant flow of water from center to circumference of the wheel; and in this way the water is sucked up to the center of the wheel, and leaves the circumference by the eduction pipe.

**Pumpkin**, a common vine-like plant and its fruit. The fruit is gourd-like, with a hard rind and thick, yellow, fibrous flesh. The plant is probably from tropical America, but is now cultivated in the temperate zones of Europe and America. The fruit is cooked and made into pies, and raw pumpkins are often used for feeding cattle.

**Punch**, a tool worked by pressure or percussion, employed for making apertures, in cutting out shapes from sheets or plates of various materials, in impressing dies, etc. Punches are usually made of steel, and are variously shaped at one end for different uses. They are solid for stamping dies, etc., or for perforating holes in metallic plates, and hollow and sharp edged for cutting out blanks, as for buttons, steel pens, jewelry, and the like.

**Punctuation**, the art of employing signs by which the parts of a writing or discourse are connected or separated as the sense requires, and the elevation, depression, or suspension of the voice indicated. Punctuation serves both to render the meaning intelligible, and to aid the oral delivery. Our present system of punctuation came very gradually into use after the invention of printing, the Venetian printers, the Manutii, contributing materially to its development. The principal points used in English composition are the *comma* (,), *semicolon* (;), *colon* (:), *period or full stop* (.), *note of interrogation* (?), *note of exclamation or admiration* (!), *dash* (—), and *parenthesis* ( ).

**Punjab** (or Panjab) (the name means "Five Rivers"), a province of British India, under the administration of a lieutenant governor. The present lieutenant governorship of the Punjab is bounded on the w. by Afghanistan and Beluchistan; on the n. by Kashmir; on the e. by the Northwest Provinces; and on the s. by Sind and Rajputana. The area, exclusive of native states, is 110,667 sq. mi.; pop. 20,866,847; inclusive of native states, the area is 142,428 sq. mi., and the pop. 25,130,127. It consists of thirty-two British districts and thirty-four native tributary states. Lahore, situated near the center of the province, is the capital of the Punjab, but its principal city is Delhi, the ancient metropolis of the Mogul sovereigns of India. The extreme northern portion of the Punjab is rendered mountainous by spurs, or offsets of the great Himalayan system; but for the most part the province consists of a series of extensive plains. The eastern plains include the most fertile and populous portion of the Punjab, with the three great cities of Delhi, Amritsar, and Lahore. Their population is largely urban; trade and manufactures flourish, and the cultivable area is generally under the plow, with the exception of the southwestern portions, where flocks and herds pasture in extensive jungles. The western plains, on the contrary, and with the ex-

## Puritans

ception of a comparatively narrow zone which is fertilized by irrigation, and which produces some of the finest wheat in the world, are covered by stunted bush, with short grass in dry seasons, and by saline plants which afford nourishment to great herds of camels. These, with cattle, sheep, and goats, are tended by a nomad population. The difference between the inhabitants of these two series of plains is also very marked, those in the eastern partaking of the character of the Hindu inhabitants of India, while those in the western resemble more the Mussulman peoples of the trans-Suleiman country. One of the most important products of the Punjab is rock salt. In addition to the manufactures common to the rest of India the industries of the Punjab include such special products as the silks of Multan and the shawls and carpets of Lahore. The province enjoys an extensive trade with adjacent countries.

**Purchase, Louisiana**, the purchase by the United States from France, of the "Province of Louisiana." In 1800 Spain retroceded Louisiana to France. The prospect of having France as a neighbor on the west, Spain on the south and England on the north, alarmed Pres. Jefferson, who immediately suggested that the U. S. proceed to buy the Floridas and the Island of New Orleans. James Monroe was dispatched upon this mission in 1803, with \$2,000,000 at his disposal. France, which was at that time at war with England, was under the direction of Napoleon. He doubted his ability to hold Louisiana against his enemy and therefore offered to sell it to the U. S. The price was finally fixed at 80,000,000 francs (\$15,000,000); the deal was consummated April 30, 1803, and ratified by the U. S. Senate, Oct. 20. The area of the new territory was about 1,000,000 sq. miles; the population, about 90,000. According to the treaty the inhabitants were to become full citizens of the U. S. as soon as possible, and the following states have been admitted into the Union: Louisiana, Arkansas, Missouri, Kansas, Colorado, Nebraska, Wyoming, North and South Dakota, Iowa, Montana, Minnesota; and Indian Territory and Oklahoma Territory have been organized. In 1904 the 100th anniversary of the purchase was celebrated by a mammoth World's Fair at St. Louis. The total cost approximated \$50,000,000; the grounds occupied 1200 acres.

**Purdue University**, a State institution of higher learning established at Lafayette, Ind., in 1869. The university is really an institute of technology and comprises schools of mechanical, civil and electrical engineering, agricultural science and pharmacy. All students are required to spend an average of three hours a day in laboratory, shop or field. In 1904, there were 96 instructors and 1,296 students. The president is W. E. Stone.

**Puritans**, a name first given to those clergymen of the Church of England who refused to conform to its liturgy, ceremonies, and discipline as arranged by Archbishop Parker and his coadjutors. In spite of the sharpest repressive measures, the principles of the party among the clergy who believed that the church did not separate itself

markedly enough from Roman Catholicism and needed further reformation gradually spread among the serious portion of the laity, who were also called Puritans. But the name appears not to have been confined to those who wished for certain radical changes in the forms of the church. The character that generally accompanied this wish led naturally enough to a wider use of the term; hence, according to Sylvester, "the vicious multitude of the ungodly called all Puritans that were strict and serious in a holy life were they ever so comformable." This is the sense in which the Elizabethan dramatists use the word. From this very breadth of usage one sees that there were different degrees of Puritanism. Some would have been content with a moderate reform in the rites, discipline, and liturgy of the church; others (like Cartwright of Cambridge) wished to abolish Episcopacy altogether, and to substitute Presbyterianism; while a third party, the Brownists or Independents, were out-and-out dissenters, opposed alike to Presbyterianism and Episcopacy. During the reigns of James I and Charles I the spirit of Puritanism continued more and more to leaven English society and the English Parliament, although the most violent efforts were made by both monarchs to extirpate it. Up till the time of the Synod of Dort (1618-19) both the Puritans and their opponents in the church had been substantially Calvinist; the strong tendency toward Arminianism among churchmen raised a new ground of controversy between the Puritans and the other sections of the church, both Laudian and Latitudinarian. The policy of Laud and the outrages practised by Charles on the English constitution led many who were not at all Genevan in their ideas to oppose both church and king for the sake of the national liberties. In the memorable "Westminster Assembly of Divines" (1643) the great majority of the ministers were Presbyterians. But the more advanced Puritans, who were predominant in the army and the Parliament, ultimately triumphed in the person of Cromwell. The Restoration (1660) brought back Episcopacy, and the Act of Uniformity (1662) threw the Puritans of the church into the position of dissenters. Their subsequent history is treated under the different forms of dissent. Before the civil war broke out so great were the hardships to which the Puritans were exposed that many of them emigrated to America, to seek liberty and peace on the solitary shores of the New World. Here they became the founders of the New England states, and cultivated unmolested that form of Christianity to which they were attached. Nowhere did the spirit of Puritanism in its evil as well as its good more thoroughly express itself than in Massachusetts.

**Pusey**, EDWARD BOUVIERIE, D. D. (1800-1882), after whom the Tractarian movement in the Church of England became designated Puseyism. In 1828 he was appointed to the regius professorship of Hebrew at Oxford, to which was attached a canonry of Christ Church. In 1833 the *Tracts for the Times* began to appear,

but he was not prominently connected with the Tractarian movement until 1835-36. He published a defense of the famous *Tract No. 90*, and in 1843 he was suspended by the vice chancellor of Oxford from preaching for three years, on account of the very high sacramental doctrine inculcated in his sermon on the Eucharist. During the rest of his life he lived very retired, though a continual flow of books, pamphlets, etc., came from his pen.

**Putnam**, ISRAEL (1718-1790), Revolutionary soldier, b. in Salem, Mass. Many incidents are related of his youthful hardihood and courage. In the war of the Revolution he was a leading spirit: commanding at Bunker Hill, and appointed by Congress one of the four major generals under Washington.

**Putnam**, Windham co., Conn., on Quinebaug River, 33 mi. n.e. of Norwich. Railroad, New York & New England. Industries: cotton, woolen, and silk mills; shoes, cutlery, trunks and steam heaters are also manufactured. Pop. 1900, 6,667.

**Putrefaction**, such a decomposition of dead organic matter as is generally accompanied by the evolution of fetid gases; now regarded as due to the agency of bacteria or other organisms floating in the atmosphere, which find a nidus in the putrescible matter and grow and multiply in it. The substances in which these animalcules are thus developed are reduced either to much more simple compounds, or to their original separate elements. The putrefaction, or putrefactive fermentation, of animal substances is usually attended by more fetid and noxious exhalations than those arising from vegetable products, chiefly through the more abundant presence of nitrogen in the former. The formation of ammonia, or of ammoniacal compounds, is characteristic of most cases of animal putrefaction, while other combinations of hydrogen are also formed, especially carbureted hydrogen, together with complicated and often highly infectious vapors or gases, in which sulphur and phosphorus are frequently discerned. These putrefactive effluvia are for the most part easily decomposed or rendered innocuous by the agency of chlorine. The rapidity of putrefaction and the nature of its products are to a great extent influenced by temperature, moisture, and access of air. A temperature between 60° and 80°, a due degree of humidity, and free access of air, are the circumstances under which it proceeds most rapidly. Hence the action of the minute organisms which produce putrefaction can be checked or altogether prevented by a very high, or a very low, temperature, by the exclusion of air, and by the absence of moisture. Antiseptics prevent and to some extent arrest the progress of putrefaction.

**Pye**, HENRY JAMES (1745-1813), poet laureate, was of an old Berkshire family. In 1784 he entered Parliament as M.P. for Bucks. Having in 1775 published a translation of six odes of Pindar, in 1778 one of Frederick the Great's *Art of War*, and in 1786 another of the *Poetics of Aristotle*, with a commentary, he was, in



## Pygmalion

1790, appointed poet laureate. In 1792 he was appointed a Westminster police magistrate. In 1801 appeared his *Alfred*, an epic.

**Pygmalion**, in Greek mythology, a king of Cyprus, who, having made an ivory image of a maiden, fell in love with his own work, and entreated Venus to endow it with life. His prayer was granted, and the maiden became his wife.

**Pygmy**, one of a race of dwarfs, first mentioned by Homer as dwelling on the shores of Ocean, and having to sustain a war against the cranes every spring. Later writers place them mainly in Africa, Aristotle at the sources of the Nile, and in fact there are dwarfish races in the interior of Africa.

**Py'lades** (-dēz), in Greek mythology, son of Strophius, king of Phocis, and Anaxibia, the sister of Agamemnon, after whose murder by Clytemnestra, their son Orestes, being carried secretly to the court of Strophius, formed the friendship with Pylades which has become proverbial. He assisted Orestes in murdering Clytemnestra, and eventually married his sister Electra.

**Pyramid**, in architecture, a colossal structure of masonry, having a rectangular base and four triangular sides terminating in a point, used by the ancients in various parts of the world for sepulchres or for religious purposes, especially in Egypt. The largest and most remarkable of the Egyptian pyramids occur in several groups on the west side of the Nile, on the border of the Libyan desert, extending for a distance of about 25 mi. from north to south, the farthest north being opposite Cairo. They are built chiefly of the hard limestone of the adjacent hills, but large blocks of granite brought from a distance are also used, especially on the outside. The four sides are so placed as to face the four cardinal points. These structures are supposed to date from about 3000 B. C. to 2300 B. C. The stones used varied in size, but are mostly large, requiring wonderful mechanical skill to quarry them, transport them, and raise and adjust them in their proper places. An almost fabulous number of laborers were engaged in erecting the chief Egyptian pyramids, of which the group of Gizeh, 4 mi. s.w. of Cairo, in the neighborhood of the ancient Memphis, is the most remarkable. This group consists of nine pyramids, among them the three most celebrated of all, the pyramid of Cheops (Khufu), called the Great Pyramid; of Cephren (Khafra); and of Mycerinus (Menkaure). According to Herodotus the Great Pyramid took 100,000 men working for ten years to make a causeway 3,000 ft. long in order to facilitate the transport of the stone from the quarries; and the same number of men for twenty years more to complete the pyramid itself. Its base forms a square, each side of which was originally 768 ft., though now, by the removal of the coating, only 750 ft. long, occupying 13 acres. The outer surface forms a series of steps, each of the average height of 3 ft. or more. When the structure was perfect this step formation was hidden by the coating, which rendered the sides quite

## Pyrenees

smooth, and the apex, where there is now a space of 12 sq. yds. was no doubt originally quite sharp. The height was originally about 480 ft., but is now only 451. The interior, entered 49 ft. above the base of the north face, contains several chambers, one of which, called the King's Chamber, is 34½ ft. long, 17 wide, and 19 high, and contains a sarcophagus of red granite. The second pyramid is 690 ft. square and 447 ft. high. The third pyramid is only 354 ft. square and 203 ft. high, and is the best constructed of the three. The six smaller pyramids which complete the Gizeh group are of much inferior interest. The pyramids are supposed to have been built by the respective kings as tombs and memorials of themselves; and it is conjectured that they were begun at the beginning of each reign, and that their size corresponded with the length of it. About 350 yards s.w. of the Great Pyramid is the celebrated Sphinx. Ruins of pyramids are to be found at Benares in India and in other parts of the East. Certain monuments of the ancient inhabitants, found in Mexico, are also called pyramids. These seem to have been intended to serve as temples, the tops of them being flat and surmounted by a house or chamber in which sacred rites were probably performed. The largest and perhaps the oldest of them is that of Cholula, which is said to have a base of 1,770 ft. and a height of 177 ft.

**Pyr'amus and This'be**, a pair of devoted lovers who, as their story is told by Ovid, resided in Babylon, and being prevented by their parents from meeting openly were in the habit of secretly conversing through an opening of the wall, as their houses adjoined. They agreed one day to meet at the tomb of Ninus, when Thisbe, who was the first at the rendezvous, was surprised by a lioness and took to flight. In her haste she dropped her garment, which the lioness seizing covered with blood, having immediately before killed an ox. Pyramus appearing on the scene, and concluding from the blood-besmeared robe that Thisbe was dead, killed himself. Thisbe returning soon afterward, and finding the body of her lover, also killed herself. The story was very popular in the time of Shakespeare, who made it the subject of the burlesque interlude in *A Midsummer Night's Dream*.

**Pyrenees'**, a lofty mountain range, the crest of the main chain of which forms the boundary between France and Spain. It abuts with one extremity on the Mediterranean, and with the other on the Atlantic. Its length, from Cape Creux on the Gulf of Lyons, to Fontarabia on the Bay of Biscay, is about 280 mi., and its greatest breadth little more than 50 mi. It consists of two lines, which form parallel ridges about 20 mi. apart from each other, except near the center, toward which the range rises both from the east and west. The descent on the south side is much more abrupt than on the north. Its loftiest summits are near its center, where its culminating point, Maladetta, or Pic de Néthou, reaches a height of 11,424 ft. The principal passes in the Pyre-

## Pyrheliometer

nees, formed by the meeting of valleys from opposite sides of the axis, take in the east part of the chain the name of Cols, and toward the center that of Ports. Only four of these are conveniently practicable for carriages. In 1885 the French and Spanish governments agreed to the construction of two railways, of which the tunnels perforating the Pyrenees were to be made at the cost of both countries. In the Pyrenees is to be found some of the finest scenery in France. The climate, genial and warm, banishes perpetual snow to 1,300 ft. higher than the snow line of the Alps. The French Pyrenees abound in mineral springs, in connection with which are some of the gayest watering places in Europe, chief among them Bagnères de Luchon. Barège is in a dreary gorge, but its waters are celebrated for their efficacy.

**Pyrheliometer**, an instrument devised by M. Pouillet for measuring the intensity of the heat of the sun. It consists of a shallow cylindrical vessel of thin silver or copper, containing water or mercury in which a thermometer is plunged. The upper surface of the vessel is covered with lamp black, so as to make it absorb as much heat as possible, and the vessel is attached to a support in such a way that the upper surface can be always made to receive the rays of the sun perpendicularly. The actual amount of heat absorbed by the instrument is calculated by ordinary calorimetric means. The area of the exposed blackened surface and the amount of water or mercury which has been raised through a certain number of thermometric degrees being both of them known, the absolute heating effect of the sun, acting upon a given area under the conditions of the experiment, can be readily found.

**Pyrometer**, any instrument, the object of which is to measure all gradations of temperature above those indicated by the mercurial thermometer. Wedgwood's pyrometer, the first which came into extensive use, was used by him for testing the heat of his pottery and porcelain kilns, and depended on the property of clay to contract on exposure to heat. Many different modes have been proposed or actually employed for measuring high temperatures; as by contraction, as in Wedgwood's; by the expansion of bars of different metals; by change of pressure in confined gases; by the amount of heat imparted to a cold mass; by the fusing point of solids; by color, as red and white heat, etc.

**Pyrrotechny**, the science of making and using artificial fireworks, the chief ingredients of which are niter, sulphur, and charcoal. Iron filings yield bright red and white sparks. Steel filings and cast iron borings contain carbon, and give a more brilliant fire with wavy radiations. Copper filings give flame a greenish tint, those of zinc a fine blue color; the sulphuret of antimony gives a less greenish blue than zinc, but with much smoke; amber, resin, and common salt give a yellow fire. Lampblack produces a very red color with gunpowder, and a pink with niter in excess. Ver-

## Pythagoras

digris imparts a pale green, sulphate of copper and sal-ammoniac a palm-tree green. Lycopodium, used also in the manufacture of stage lightning, burns with a rose color and a magnificent flame.

**Pyrrho**, a Grecian philosopher of Elis, founder of the Pyrrhonian or skeptical school, flourished about 340 B.C. He was early led to apply himself to philosophy by the writings of Democritus, and, accompanying his master, Anaxarchus, to India, in the train of Alexander the Great, he there became acquainted with the doctrines of the Brahmins, Magi, and other eastern philosophers. Spending a great part of his life in solitude, and abstaining from all decided opinions concerning moral and physical phenomena, he endeavored to attain a state of tranquillity not to be affected by fear, joy, or sorrow. He d. in his ninetyeth year; the Athenians erected a statue in honor of him, and his countrymen, who had made him a high priest, raised a monument to his memory. His chief doctrines were the uncertainty of all human knowledge, and the belief that virtue is the only good. Pyrrho left no writings. It is only from the works of his later followers, particularly Sextus Empiricus, that we learn the principles of his school.

**Pyrrhus** (318-272 B.C.), king of Epirus, one of the most illustrious generals of antiquity. He was placed on the throne of his ancestors when about twelve years of age, and reigned peacefully five years, when advantage was taken of his absence to transfer the crown to his great uncle, Neoptolemus. After serving with his brother-in-law, Demetrius Poliorcetes, and greatly distinguishing himself at the battle of Ipsus, against Antigonus, B.C. 301, Pyrrhus recovered his dominions, which he shared with his rival, and then caused the latter to be put to death. He next contended for possession of Macedonia, and in 280 passed over into Italy to assist the Greeks against Rome. He defeated the Romans in two battles, but with severe loss to himself; then passed over into Sicily, returned to Italy again, and was defeated at Beneventum 275 B.C. He now retired to Epirus, took part in the Greek troubles, and was killed at Argos.

**Pyrus**, a genus of ornamental and fruit trees, the latter forming the chief of our orchard fruit, and belonging to the pomeous section of the nat. order Rosaceæ. There are about forty species, natives of the north temperate and cold regions.

**Pythagoras** (586-506 B.C.), a Grecian philosopher. He is said to have gathered knowledge from the philosophers or learned men of Phœnicia, Syria, Egypt, Babylon, India, etc., but eventually settled at the Greek city of Crotona in Lower Italy, probably about 529 B.C. His abilities and character led great numbers to adopt his views. Three hundred of these were formed into a select fraternity or order, and were bound by vow to Pythagoras and each other, for the purpose of cultivating the rites and observances enjoined by their master, and studying his philosophy. The political influence of this body became very considerable,

## Pythagorean Theorem

and was exerted in the interest of the aristocratic party. The democratic party strenuously opposed the growing power of the order, and their enmity caused Pythagoras to retire to Metapontum. So far as we can judge, his system appears to owe very much to a vivid imagination acting upon the then prevailing ignorance respecting the order of nature. What was not known was guessed at, with the usual result. In the case of Pythagoras, as in that of other teachers of those early times, the popular effect of this partial knowledge was heightened by mingling it with secret doctrines. One of these doctrines was the transmigration of souls; and Pythagoras is said to have believed himself to have previously lived in several bodies. He had also abstruse theories respecting numbers, geometry, and music, which he valued very highly as fitting the soul for contemplation. The effect of his teaching, however, was such that his disciples are said to have paid him divine honors after his death. In appearance he was grave, commanding, and dignified. He abstained from all animal food, limiting himself to a vegetable diet. His public instruction consisted of practical discourses in which he recommended virtue and dissuaded from vice, with a particular reference to the various relations of mankind, as those of husbands and wives, parents and children, citizens and magistrates, etc.

**Pythagorean Theorem**, the forty-seventh proposition of the first book of Euclid's Elements, which shows that in any right-angled triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides.

**Pyth'eas**, a famous navigator of the Greek colony of Massilia, now Marseilles, supposed to have lived about the time of Alexander the Great (say 330 B.C.) He is reputed to have sailed along the west coast of Europe, entered the English Channel, and traveled some distance in Britain, then, continuing his journey northward, to have arrived at Thule (supposed to be Iceland). In a second voyage he entered the Baltic, where he proceeded as far as a river which he called Tanais, and on the banks of which amber was found. We only know of him through Strabo, Pliny, and others.

**Pythian Games**, one of the four great Grecian games, instituted in honor of Apollo, and celebrated at Delphi. Until about 586 B.C. they were under the management of the Delphians, and took place every eighth year; but after

## Python

that date they were conducted by the Amphictyons, and celebrated every fourth year, prizes being given for flute-playing, athletic sports, and horse and chariot racing. Eventually, contests in tragedy, painting, sculpture, etc., were added. At first, prizes of silver or gold were awarded, but afterward the simple laurel wreath and palm branch were substituted. They continued to be celebrated until the end of the fourth century of our era.

**Python**, a genus and family of serpents allied to the family Boidæ or Boas. They are not venomous, but kill their prey by compression. The pythons belong exclusively to the Old World, and are of enormous size, some-



Python.

times attaining a length of 30 ft. They are found in India, and in the islands of the Eastern Archipelago, in Africa and in Australia. A rudimentary pelvis and traces of hinder limbs exist in the pythons, these structures terminating externally in a kind of hooked claw. The head exceeds the neck in thickness, and the mouth is extremely large. Aided by their prehensile tails, and rudimentary hinder limbs, the pythons suspend themselves from the branches of trees, and lie in wait near water for animals which come to drink. The genus *python* contains various species, the best known of which is the West African python, common in menageries. The female python hatches her eggs by the heat of her body.



# Q

## Quadi

**Q**, the seventeenth letter in the English alphabet, a consonant having the same sound as *k* or hard *c*. It is a superfluous letter in English, as the combination *qu*, in which it always occurs, could be equally well expressed by *kw* or *k* alone when the *u* is silent. It did not occur in the Anglo-Saxon alphabet, the sound *qu* in Anglo-Saxon words being regularly written *cw* or *cu*, but was borrowed from the French-Latin alphabet.

**Quadi**, a Teutonic tribe whose ancient territory was on the Danube, extending to the Theiss on the east and to the Carpathian Mountains on the north. They long waged destructive wars with the Romans, particularly under Marcus Aurelius, but ceased to be heard of in the fifth century, having probably migrated farther west with the Suevi.

**Quadrangle**, in geometry, a quadrilateral figure; a plane figure having four sides, and consequently four angles. In ordinary language it is a square or quadrangular court surrounded by buildings, as often seen in the buildings of a college, school, or the like.

**Quadrant**, an instrument for measuring angular altitudes, variously constructed and mounted for different specific uses in astronomy, navigation, surveying, etc., consisting originally of a graduated arc of 90°, with an index or vernier, and either plane or telescopic sights, along with a plumb line or spirit level for fixing the vertical or horizontal direction. Its principle and application is the same as that of the sextant, by which it is superseded.

**Quadrate Bone**, a bone developed in reptiles and birds, by means of which the lower jaw is articulated or joined to the skull. The lower jaw of these forms is thus not articulated directly or of itself to the skull, as in mammals.

**Quadriga**, an ancient two-wheeled car or chariot drawn by four horses abreast. It was used in racing in the Greek Olympic games, and in the games of the Roman circus.

**Quadrille**, a dance of French origin, which consists generally of five consecutive figures or movements, danced by four sets of couples, each forming the side of a square.

**Quadrumania** ("four-handed"), the name applied by Cuvier and others to denote the order of mammalia represented by the lemurs, monkeys, and apes, from the fact that these forms agree in possessing a great toe so constructed as to be capable of opposing the other digits of the feet, instead of being placed parallel with the other toes, thus forming a kind of "hand" adapted for supporting the foot on the ground. This conversion of the feet into hand-like organs presented to Cuvier's mind so different and remarkable a structure from the disposition of the feet and toes of man, that he separated man as a sole and single genus to represent the distinct and opposing order of

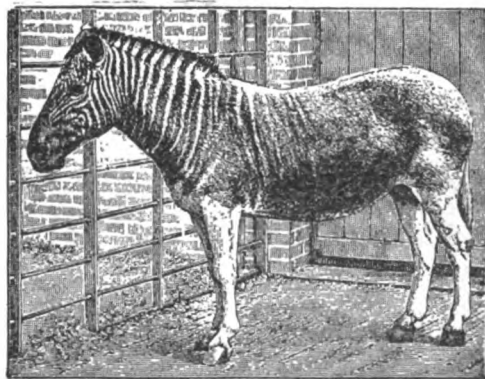
## Quagga

*Bimana* or "two-handed" mammalia. But in modern zoology, man is generally included in one order with the apes and monkeys—the order Primates, of which man constitutes a distinct family or section.

**Quadruple Alliance**, an alliance, so called from the number of the contracting parties, concluded in 1718 between Great Britain, France, and Austria, and acceded to by Holland in 1719, for the maintenance of the Peace of Utrecht. The occasion of the alliance was the seizure by Spain of Sardinia in 1717, and Sicily in 1718, both of which she was forced to give up. Another quadruple alliance was that of Austria, Russia, Great Britain, and Prussia, in 1814, originating in the coalition which had effected the dissolution of the French Empire.

**Quæstor**, the name of certain magistrates of ancient Rome whose chief office was the management of the public treasure, being receivers of taxes, tribute, etc. Quæstors accompanied the provincial governors and received taxes, paid the troops, etc. The office could at first be held only by patricians until 421 B.C., when the number, which had formerly been two, was doubled, and plebeians became eligible. The number was further increased to eight after the outbreak of the First Punic War. As province after province was added to the Roman territory the number of quæstors was again increased, till under Sulla it reached twenty, and in the time of Julius Cæsar, forty.

**Quagga**, a species of the horse genus, nearly allied to the zebra, and formerly found on the



Quagga.

plains of Southern Africa. Striped like the zebra, it yet possesses no bands on the limbs; of a dark or blackish-brown on the head, neck, and shoulders, the back and hind quarters were of a lighter brown, while the croup was of a russet gray. The under parts of the body were white, the upper parts of the legs and

## Quail

tail being marked by whitish bars. The quagga was of smaller size than the zebra, and in general conformation bore a closer resemblance to the horse. Gregarious in habits, the quagga is said to have mingled indiscriminately with the zebra herds. Its food consisted of grasses and mimosa leaves. It is now said to be absolutely extinct. The animal to which the name quagga is now applied is Burchell's zebra.

**Quail**, a genus of rasorial birds, included in the family of the partridges, to which they are



Common Quail.

nearly allied, but from which they differ in being smaller, in having a relatively shorter tail, no red space above the eye, longer wings, and no spur on the legs. The common quail is a migratory bird, and is found in every country of Europe, and in many parts of Asia and Africa. It is about 8 in. in length. The color of the upper parts is brownish with lighter and darker markings, of the under parts yellowish. The quail is very pugnacious, and in some places quail fights are a form of amusement, as was the case also in ancient times. There are several other species, in appearance and habits not greatly differing from the common quail, as the Coromandel quail, the Australian quail, the white-throated quail, the Chinese quail, an elegant little species measuring only 4 in. in length, etc. The name quail is also given to some birds of other genera, as the Virginian or Maryland quail, and the Californian or crested quail. The Virginian quail is common throughout North America, and extends as far south as Honduras. It is rather larger than the European quail. The flesh is very white and tender, and is unequaled in delicacy by any other member of its order in America.

**Quakers** (or Society of Friends), founded in England in 1648 by George Fox, a man of pure life and zealous devotion. From the first they were persecuted on all hands, and some of them were punished by the authorities with transportation. Their belief, as originally announced and not materially changed to this day, differs but little from the main creeds of orthodox believers. The principal feature which especially characterizes their faith is the doctrine of the "Light of Christ in Man." They found this doctrine on the view of Christ given by St. John, where, in the first chapter of his gospel, he speaks of the "word" as the "life," and "light of man," "the true light," "the light that lighteth every man that com-

## Quantity

eth into the world," etc. In 1827, Elias Hicks, a Quaker of great influence and strong mental gifts, created a schism among the denomination in the U. S. by the dissemination of views embracing a denial of the miraculous conception and divinity of Christ and also the inspiration of the Scriptures. Nearly one half of the Quakers of this country became converts of Hicks, and have since been known as Hicksite Quakers or Friends, while the adherents to the old faith are recognized as Orthodox Quakers. In England the denomination has greatly diminished in later years, only about 30,000 of the entire number of the body (something over 100,000) being in that country.

The Quakers are marked by a number of peculiarities both in their method of worship and in their ways of life. They have no stated ministry, and in conducting their meetings each individual speaks "as moved by the spirit." The congregation is divided according to sex, the males sitting on one side of the "meeting-house" and the females on the other. Women have a special sphere of discipline allotted to them, being that of inspecting and relieving the wants of the poor of their own sex, taking cognizance of proposals for marriage, etc. The Quakers are non-combatants and uncompromisingly opposed to war, and are especially noted for their philanthropic spirit. In their organization they have four classes of assemblages: first, the *preparative* meetings; second, the *monthly* meetings; third, the *quarterly* meetings; and fourth, the *yearly* meetings. In these different gatherings are settled all questions of discipline and executive management. But the government of the body is exceedingly simple, and it is seldom that any serious differences occur among its members.

**Quaking Grass**, a genus of grasses, so named from their spikelets being always in a state of tremulous motion, in consequence of the weakness of the footstalks by which they are supported. *Briza maxima*, a native of Southern Europe, has long been cultivated as a garden annual on account of its large and handsome drooping spikelets. *B. media*, a perennial plant, is naturalized in the vicinity of Boston, its flowers forming elegant panicles.

**Quam'ash**, the North American name of a plant of the lily family with an edible bulb. These bulbs are much eaten by the Indians, and are prepared by baking in a hole dug in the ground, then pounding and drying them into cakes for future use.

**Quamoc'lit**, a genus of climbing ornamental plants, chiefly found in the hot parts of America, but some species are indigenous both in India and China.

**Quantampoh**, a town of Western Africa, in the Ashantee kingdom, about 100 mi. n. of Coomassie, and the seat of a considerable trade in slaves, cola-nuts, etc. Pop. 15,000.

**Quantity**, that property of anything, in virtue of which it is capable of being measured, increased, or diminished, relating to bulk, weight, or number. In mathematics a quantity is anything to which mathematical

## Quarantine

processes are applicable. In grammar it signifies the measure of a syllable, or the time in which it is pronounced—the metrical value of syllables as regards length or weight in pronunciation. In Latin and Greek poetry quantity and not accent regulates the measure.

**Quar'antine** (It. *quarantina*, a space of forty days), the period (originally forty days) during which a ship coming from a port suspected of contagion, or having a contagious sickness on board, is forbidden intercourse with the place at which she arrives. By act of Congress passed in 1888 national quarantine stations were established; and it is made a misdemeanor punishable by fine or imprisonment, or both, for the master, pilot, or owner of any vessel entering a port of the U. S. in violation of the act, or regulations framed under it. Quarantine was first introduced at Venice in the fourteenth century.

**Quarles**, FRANCIS (1592-1644), an English poet, b. near Rumford in Essex, educated at Cambridge, and entered at Lincoln's Inn. He was for some time cupbearer to Elizabeth, queen of Bohemia, and in 1621 went to Dublin, where he became under secretary to Archbishop Ussher. Of the works of Quarles, in prose and verse, the most celebrated is his *Emblems*, a set of designs illustrated by verses. Among his poems are *Divine Poems*, *Divine Fancies*, and *Argalus and Parthenia*. His *Enchiridion* is a collection of brief essays and aphorisms, in vigorous and occasionally eloquent language.

**Quarne'ro**, GULF OF, in the Adriatic Sea, between Istria and the Croatian coast, 15 mi. in length and breadth. It is nearly enclosed leeward by the islands of Cherso and Veglia, and communicates with the Adriatic by three channels. Seamen dread the gulf on account of the terrific storms to which it is subject.

**Quarter**, the name of two measures, one of weight and the other of capacity. The first is the fourth part of a hundredweight or 28 lbs. The second contains 8 bu. and 4 pks.

**Quartermaster**, in the army, an officer who attends to the quarters for the soldiers, their provisions, fuel, forage, etc. There is a quartermaster on the staff of each regiment, in which he holds the relative rank of lieutenant. A quartermaster in the navy is a petty officer appointed by the captain, who, besides having charge of the stowage of ballast and provisions, coiling of ropes, etc., attends to the steering of the ship.

**Quartermaster General**, a staff officer of high rank in the army, whose department is charged with all orders relating to the marching, embarking, disembarking, billeting, quartering, and cantoning of troops, encampments and camp equipage. The quartermaster general is attached to a whole army under a commander in chief, and holds the rank of brigadier general. To his department are attached 4 colonels, 8 lieutenant colonels, 14 majors, and 30 captains.

**Quartermaster Sergeant**, is a non-commissioned officer who acts as assistant to the quartermaster.

## Quassia

**Quarter-staff**, an old English weapon formed of a stout pole about 6½ ft. long, generally loaded with iron at both ends. It was grasped by one hand in the middle, and by the other between the middle and the end. In the attack the latter hand shifted from one quarter of the staff to the other, giving the weapon a rapid circular motion, which brought the loaded ends on the adversary at unexpected points.

**Quartz**, the name given to numerous varieties of the native oxide of silicon, called also silicic acid. Quartz embraces a large number of varieties. It occurs both crystallized and massive, and in both states is most abundantly diffused throughout nature, and is especially one of the constituents of granite and the older rocks. When crystallized it generally occurs in hexagonal prisms, terminated by hexagonal pyramids. It scratches glass readily, gives fire with steel, becomes positively electrical by friction, and two pieces when rubbed together become luminous in the dark. The colors are various, as white or milky, gray, reddish, yellowish or brownish, purple, blue, green. Quartz veins are often found in metamorphic rocks, and frequently contain rich deposits of gold. The principal varieties of quartz known by distinct names are the following: 1, *rock crystal*; 2, *smoky quartz*; 3, *yellow quartz*; 4, *amethyst*; 5, *siderite or blue quartz*; 6, *rose quartz*; 7, *milky quartz*; 8, *irised quartz*; 9, *common quartz*; 10, *fat (greasy) quartz*; 11, *flint*; 12, *hornstone*; 13, *Lydian stone*; 14, *floatstone (swimming stone)*; 15, *fibrous quartz*; 16, *radiating quartz*; 17, *chalcedony*; 18, *carnelian*; 19, *chrysoprase*; 20, *agate*. Agate implies the occurrence of two or more of the above varieties existing together in intimate union. Cat's eye, aventurine, prase, plasma, heliotrope, Compostella hyacinth, jasper (red, brown, striped, and porcelain), jasper agate, Mocha stone, Venus-hair agate, etc., formerly included under quartz, are only mixtures of this mineral with other substances. Several varieties of quartz are of important use in the arts and manufactures. The ancients regarded rock crystal as petrified water, and made use of it for the fabrication of vases. At present it is employed not only for cups, urns, chandeliers, etc., but for seals, spectacle glasses, and optical instruments. Quartz enters into the composition of glass, both white and colored. In the manufacture of porcelain it is added in the state of an impalpable powder, and forms part of the paste; it is also used in other kinds of pottery. Quartz is used as a flux in the melting of several kinds of ores, particularly those of copper, and in other metallurgical processes. Touchstone is a hard velvety-black variety of Lydian stone.

**Quartzite** (Quartz rock), a metamorphic stratified, granular, crystalline rock consisting entirely, or almost entirely, of quartz. It is usually a sandstone which has been altered by heat, etc. It is generally of a grayish or pinkish-gray color, from a slight trace of iron.

**Quassia** is a genus of South American tropical plants, consisting of trees and shrubs, nat. order



## Quaternions

Simarubaceæ. The wood of two species is known in commerce by the name of *Quassia*; *Q. amara*, a native of Panama, Venezuela, Guiana, and Northern Brazil, a small tree with handsome crimson flowers; and *Q. excelsa*, a native of Jamaica. Both kinds are imported in billets, and are inodorous, but intensely bitter, especially the Jamaica quassia. Quassia is a pure and simple bitter, possessing marked tonic properties. An infusion of quassia sweetened with sugar is useful to destroy flies. *Q. excelsa* was formerly substituted by some brewers for hops, but is now prohibited under severe penalties.

**Quater'nions**, the name given by Sir William Rowan Hamilton to a method of mathematical investigation discovered and developed by him. It is most important in its applications to physics, especially in crystallography, optics, kinematics, and electro-dynamics. According to the discoverer, "A *Quaternion* is the quotient of two vectors, or of two directed right lines in space, considered as depending on a system of *Four Geometrical Elements*; and as expressible by an algebraical symbol of *Quadrinomial Form*. The science, or *Calculus of Quaternions*, is a new mathematical method wherein the foregoing conception of a *quaternion* is unfolded, and symbolically expressed, and is applied to various classes of algebraical, geometrical, and physical questions, so as to discover many new theorems, and to arrive at the solution of many difficult problems."

**Quatre-Bras** (kâ-tr-brâ), a village of Belgium, in the province of South Brabant, 20 mi. s.s.e. of Brussels, situated at the intersection of the main roads between Brussels and Charleroi, and from Nivelles to Namur. It is famous for the battle fought here (June 16, 1815) between the English under Wellington and the French under Ney, in which the former were victorious.

**Quatrefages de Bréau** (kâ-tr-fâzh dê brâ-ô), JEAN LOUIS ARMAND DE, French naturalist, b. in 1810; took his M. D. degree at Strasburg in 1838; and has been professor of zoology at Toulouse, the Lycée at Paris, and professor of anatomy and ethnology at the Musée d'histoire Naturelle. He was elected a member of the Royal Society, London, in 1879. His contributions to science include numerous researches into the lower grades of life, and a valuable series of anthropological studies.

**Quatrefoil** (kwâ-têr-foil), in architecture an opening or a panel divided by cusps or foliations into four leaves, or more correctly the leaf-shaped figure formed by the cusps. It is an ornament which has been supposed to represent the four leaves of a cruciform flower, and is common in the tracery of Gothic windows. Bands of small quatrefoils are much used as ornaments in the perpendicular Gothic style, and sometimes in the decorated. The same name is also given to flowers and leaves of similar form carved as ornaments on moldings, etc.

**Quay**, MATTHEW S. (1833-1904), an American politician, educated at Jefferson College. He was admitted to the bar in 1854, but spent the

## Quebec

years of 1861-65 in military service. From 1865-67 he was a member of the legislature. Subsequently he was secretary of the Commonwealth, recorder of Philadelphia, state treasurer, and member of the Republican National Committee, of which, during the presidential campaign of 1888, he was chairman. From 1887-99 he was United States Senator from Pennsylvania. In 1899, he was tried for misappropriation of public funds, but acquitted April 21, and on the same day appointed United States Senator. He was re-elected to this office in 1901, and served in the Senate until his death in 1904.

**Quebec'**, a city and shipping port of the Dominion of Canada, capital of the province of Quebec, situated on a promontory near the confluence of the St. Charles with the St. Lawrence, terminating abruptly in Cape Diamond, which has a height of 333 ft., and on the banks of both streams. It is about 400 mi. from the mouth of the St. Lawrence and 140 mi. n.e. of Montreal, to which the river is navigable for large vessels. It is divided into the upper and lower towns. The former, placed on the summit of the promontory, is strongly fortified, the fortifications comprising a citadel and other works. The lower town, the great seat of business, lies under the cliffs, along the St. Lawrence and the St. Charles. The chief educational institution is Laval University, with faculties of law, medicine, theology, and arts, and a library of nearly 80,000 volumes. Another great educational institution is the Grand Seminary. The chief convent is the Ursuline Convent, covering 7 acres of ground, and having connected with it an extensive establishment for the education of females. On the Plains of Abraham, west of the upper town, a column 40 ft. high has been erected to the memory of General Wolfe; while in the upper town there is a handsome obelisk, 65 ft. high, to the joint memory of the two commanders, Wolfe and Montcalm, who both fell at the taking of Quebec. Shipbuilding is the chief industry. There are also manufactures of iron castings, machinery, cutlery, nails, leather, paper, india-rubber goods, rope, tobacco, beet-root sugar, etc. Quebec is the chief seat of the Canadian trade in timber. The basin of the St. Lawrence immediately below the town, where it is 2,500 yards wide, affords excellent anchorage for ships of large tonnage, while the wharves along the banks of both rivers afford accommodation for the largest vessels. The river is free from ice usually from the 1st of April till the middle of December. Quebec was founded in 1608 by Champlain, who was sent on an exploring expedition from France. In 1629 it came into the hands of the English, but was restored in 1632 to the French, in whose possession it remained till 1759, when it fell into the hands of the British in consequence of Wolfe's famous victory on the Plains of Abraham. The great bulk of the inhabitants (more than five sixths) are Roman Catholics, chiefly French Canadians. Pop. 1901, 68,834.

**Quebec**, a province of the Dominion of Can-

## Quebracho

ada, lying mainly between 52° 30' and 45° n. lat., and between 57° 7' and 79° 33' w. lon. It is bounded on the n. by Labrador and the Northeast Territory of Canada; on the e. by Labrador and the Gulf of St. Lawrence; on the s. by the Chaleurs Bay, New Brunswick, and the states of Maine, New Hampshire, Vermont, and New York; and on the s.w. by the River Ottawa, which separates it from the province of Ontario. It is nearly 1,000 mi. in length from e. to w. by 300 in breadth, and has an area of 347,350 sq. mi. The chief mountains are the Notre Dame or Shickshock Mountains, extending along the south side of the St. Lawrence, and forming a table-land 1,500 ft. high, with peaks rising to the height of 4,000 ft.; and the Laurentian Mountains, or Laurentides, which stretch from the coast of Labrador to the Ottawa River, and rise to a height of from 1,200 to 4,000 ft. The chief islands are Anticosti, at the mouth of the St. Lawrence, and the Magdalen Islands in the Gulf of St. Lawrence. The chief river is the St. Lawrence, which flows through the entire length of the province. Next to it in importance is its chief tributary, the Ottawa, over 700 mi. in length. The other largest rivers are the St. Maurice and the Saguenay. The province boasts many beautiful lakes, the chief being Grand Lake, Temiscamingue, and Lake St. John, from which issues the Saguenay. The climate is variable, though salubrious, the temperature ranging from 20° below zero in winter to 90° in summer. The soil is generally fertile, and well suited for the growth of cereals, hay, etc.; maize, flax, and tobacco are also grown, especially to the west of the longitude of Quebec, while grapes, melons, peaches, and tomatoes in this region come to maturity in the open air. A large portion of the province is still covered with forest, the white and red pines and the oak being the most valuable trees for timber. The fisheries are extensive and valuable. The minerals worked include apatite, asbestos, gold, copper, iron, plumbago, etc. The manufactures are steadily increasing, and include furniture, leather, paper, chemicals, boots and shoes, woolen goods, steam and agricultural machinery. The chief exports are timber and fish. The educational system embraces institutions of all grades, from primary schools upward, at the top being three universities — Laval University, Quebec (Roman Catholic); Macgill University, Montreal (Protestant); and Bishop's College, Lennoxville (Anglican). The capital is Quebec, but Montreal is the largest town. The population in 1901 was 1,620,974, most of whom are of French descent.

**Quebracho** (ke-brä'chō), the name given to several trees of different genera, but with similar qualities, indigenous to South America, valuable alike for their wood and their bark. The red quebracho is very hard, but splits easily. The bark and wood are used in tanning. The white quebracho is used for wood-engraving. The bark contains six alkaloids, and is used as a remedy for asthma, being employed as a decoction and a tincture.

## Queensland

**Quedah** (or Keddah), a small state on the west coast of the Malay Peninsula, north of Province Wellesley. It is a well-wooded and mountainous country with numerous rivers, for the most part navigable. The climate is warm but healthy. The chief products are rice, pepper, ivory, and tin. Pop. 30,000. The capital, of same name, has a pop. of 6,000.

**Queen** (Anglo-Saxon *cwēn*, a woman), the wife of a king. In Great Britain the queen is either *queen-consort* or merely wife of the reigning king, who is in general (unless where expressly exempted by law) upon the same footing with other subjects, being to all intents the king's subject, and not his equal; or *queen-regent*, regnant, or sovereign, who holds the crown in her own right, and has the same powers, prerogatives, and duties as if she had been a king, and whose husband is a subject; or *queen-dowager*, widow of the king, who enjoys most of the privileges which belonged to her as queen-consort. In Prussia, Sweden, Belgium, and France there can be no queen-regnant. See *Salic Law*.

**Queen Bee**, the sovereign of a swarm of bees, the only fully developed and prolific female in the hive, all the other inhabitants being either males (that is drones) or neuters.

**Queen Charlotte Islands**, a group of islands in the North Pacific Ocean, off the mainland of British Columbia, north of Vancouver Island, discovered by Cook about 1770, and annexed to the British crown in 1787. The northernmost of the two larger islands is called Graham Island, and the southernmost Moresby Island. The greatest length of the two together is about 160 mi., and the greatest breadth (of the northern island) about 70 mi. All the islands are covered with magnificent forests; gold-bearing quartz of rich quality has been found, and copper and iron ores and a fine vein of anthracite coal also exist. The islands form part of British Columbia.

**Queen Charlotte Sound**, a channel in the North Pacific Ocean, separating Vancouver Island from the mainland of British America on the north, and forming the commencement of a long series of inlets continued along the north and east of that island.

**Queen's Bench** (or King's Bench), COURT OF, a separate court formerly existing in England, and divided into several branches for the trial of different kinds of pleas. With the Common Pleas and Exchequer it now forms the Queen's Bench Division of the High Court of Justice, and is presided over by the Lord Chief Justice of England.

**Queensland**, an Australian state, comprising the whole northeast portion of Australia north of New South Wales, and east of South Australia and its Northern territory, being elsewhere bounded by the Gulf of Carpentaria, Torres Strait, and the Pacific. A considerable portion is thus within the tropics, the most northern part forming a sort of peninsula, known as York Peninsula. See *Australia*. It has an area of about 668,224 sq. mi., and is divided into twelve large districts, namely, Moreton (East and West), Darling Downs, Burnett,

## Queensland

Port Curtis, Maranoa, Leichhardt, Kennedy, Mitchell, Warrego, Gregory, Burke, and Cook. Most of these districts are now subdivided into counties. Toward the west a large portion of the surface is dry and barren, but toward the east, and for a long stretch along the coast, boundless plains or downs, admirably adapted for sheep-walks, and ranges of hills, generally well wooded and intersected by fertile valleys, form the prevailing features of the country. The coast is skirted by numberless islands, and at some distance is the Great Barrier Reef. The highest mountains are near the coast, the greatest elevation being about 5,400 ft. The principal rivers are the Brisbane, the Burnett, the Pioneer, the Fitzroy, and the Burdekin, flowing into the Pacific, and the Flinders and Mitchell into the Gulf of Carpentaria. Some of these streams are navigable for a considerable distance inland. The coast is indented with many noble bays, affording some capacious natural harbors, which have already been brought into practical use as the outlets for the produce of the adjacent districts. The climate is healthful, and the temperature comparatively equable. The mean temperature at Brisbane is 69°, the extreme range being from 35°, to 106°. In the more northern parts the climate is tropical. The rainfall in the interior is scanty and variable; the mean at Brisbane is about 35 inches. The indigenous animals and plants are similar to those of the rest of Australia. There are many kinds of valuable timber trees, and a rare thing in Australia, a few good indigenous fruits. Sheep farming is the chief industry, but agriculture (including sugar growing), cattle rearing, and mining are also important. The soil and climate are well suited for the production of all the ordinary cereals, as well as maize, tobacco, coffee, sugar, cotton, etc. The chief products are sugar, maize, English and sweet potatoes, arrow-root, and semi-tropical fruits. Sugar growing is becoming a very important industry. Gold, tin, lead, and copper are the principal minerals. The gold fields extend over an area of 15,000 sq. mi., and employ about 9,500 miners. Coal and plumbago are found in large quantities; and cinnabar, antimony, and manganese are also among the mineral products. The coal measures are estimated to cover about 24,000 sq. mi., and coal is now raised. In the north pearl fishing is actively carried on. The manufactures are unimportant. The principal manufactories, or works that may be classed as such, are sugar mills, steam sawmills, soap works, agricultural implement works, and distilleries. There are now over 28,000 mi. of railways in operation, and nearly 19,000 mi. of telegraph lines, and the telephone is coming rapidly into use. Education is free and secular in the public schools, and is under a special department controlled by the minister of education. A Queensland university is about to be established. There is no established church, each religious denomination being entirely self-supporting. The principal imports are apparel and haberdashery, cottons and woollens, flour,

## Queenstown

iron, and steel, boots and shoes, tea, spirits, hardware, machinery, wine, etc.; and the principal exports are wool, gold, tin, sugar, preserved meat, cotton, wood, hides, and skins. The staple articles of export to the United Kingdom are wool, tallow, and preserved meats. A duty of 5 per cent. is charged on imports of yarns, woven fabrics, paper, stationery, etc.; and duties at other and even higher rates on other articles. The first settlement of Queensland took place in 1825, when the territory was used as a place of transportation for convicts, who continued to be sent there till 1839. In 1842 the country was opened to free settlers. It was originally a part of New South Wales, and was organized as a separate colony in 1859. As a colony, the government was vested in a governor, who was the queen's representative, and a parliament of two houses, the legislative council and the legislative assembly. The council consists of thirty-nine members appointed by the crown for life, and the assembly of seventy-two members elected by the people for five years, and representing sixty electoral districts. The capital of the state is Brisbane. Other noteworthy towns are Cooktown, Gympie, Mackay, Rockhampton, Bundaberg, Warwick, etc. Queensland is now one of the states of the commonwealth of Australia which was inaugurated Jan. 1, 1901. Pop. 1900, 512,604.

**Queen's Pigeon**, a magnificent ground pigeon inhabiting the islands of the Indian Ocean, named after Queen Victoria. It is one of two species constituting the genus *Goura* (*G. Victoriae*), and is the largest and most beautiful species of the order.

**Queen's Speech**, or King's Speech, the name given to the paper prepared by the advisors of the British sovereign and read by him from the throne in the House of Lords at the opening and closing of each session of Parliament. The speech at the opening sets forth the relations of the empire and states the measures which the ministers intend to bring before Parliament; that at the close thanks both houses for their attention to business.

**Queen's Tobacco-pipe**, the name popularly given to a furnace in London, situated in the northeast corner of the tobacco warehouses belonging to the London docks; so called because it is used for burning all sorts of contraband or smuggled articles seized by the custom house officers, but especially tobacco and cigars.

**Queenstown**, formerly Cove of Cork, a maritime town of Ireland, and an important naval station, 9 mi. s. e. of Cork, on the south side of Great Island, which rises abruptly out of Cork harbor to a considerable elevation. The streets rise above one another and present a very picturesque appearance. Queenstown is defended by fortifications on Spike Island and at the entrance of the harbor, which is large and well sheltered. It is the port for the transmission of American mails, and a chief emigration station. It has little trade and no manufactures, being almost solely dependent on the military and naval establishments in its vicinity, and



## Quelpart

on the numerous visitors attracted by the singular beauty of the place, and by its delightful climate. Pop. 9,755.

**Quelpart**, a rock-bound island, 60 mi. long by 17 broad, off the south coast of Korea, of which it is a penal settlement. The soil is fertile, the climate temperate, and there is a large population. The interior is mountainous, and one summit, the volcanic Mount Auckland, is 6,500 ft. high.

**Quentin**, Sr. (san kân-tan), an ancient town of France, dep. of Aisne, on a height above the Somme, 87 mi. n.e. of Paris, which from its position on the frontiers between France and the Low Countries figures much in history. The staple manufactures are cotton and woolen goods. The environs are covered with bleach-fields. The French were signally defeated here in 1557 by the Spaniards, the town being afterward taken and sacked. In January, 1871, the French were driven out of the town by the Germans after a sanguinary struggle. Pop. 47,551.

**Querétaro** (ke-râ'tâ-rô), a city in Mexico, capital of the state of the same name, on a plateau 6,365 ft. above sea level, 110 mi. n.w. of Mexico. Among the more noteworthy public edifices are the principal church, a magnificent and richly decorated structure, and an aqueduct about 2 mi. long, with arches 90 ft. high, and by communicating with a tunnel in the opposite hills, bringing a copious supply of water from a distance of 6 mi. Maximilian of Austria was made prisoner and executed here, 1867. Pop. 36,000. The state of QUERÉTARO has an area of 3,207 sq. mi., and forms part of the central plateau of the Cordillera, presenting a very rugged surface, traversed by mountain spurs and lofty heights. Grain and cattle form the chief wealth of the state. The minerals are comparatively unimportant. Pop. 213,525.

**Quirimba Islands**, a chain of low coralline islands extending along the east coast of Africa, and comprised in the Portuguese territory of Mozambique. There is a town and fort on the chief of them, Ibo.

**Quesnay** (kâ-nâ'), FRANÇOIS (1694-1774), a French physician of some eminence, but chiefly noted as a writer on political economy. He was appointed surgeon in ordinary to the king, and subsequently having taken the degree of M.D., physician to Madame de Pompadour, the mistress of Louis XV, who afterward got him appointed physician to the king. He was the author of various surgical and medical works; of several articles in the *Encyclopédie*, in which he expounds his economical views; and tracts on politics, including a treatise on the *Physiocratic System* (1768).

**Quetelet** (kât-lâ), LAMBERT ADOLPHE JACQUES (1796-1874), Belgium statistician and astronomer, born at Ghent, studied at the Lyceum of his native town, where, in 1814, he became professor of mathematics. In 1819 he was appointed to the same chair in the Brussels Athenæum. In 1828 he became lecturer in the Museum of Science and Literature, holding the post till 1834, when the institution was

## Quicksand

merged in the newly established university. Quetelet superintended the erection of the Royal Observatory, and became its first director (1828). A member of the Belgium Royal Academy, he became its perpetual secretary in 1834. Quetelet's writings on statistics and kindred subjects are very numerous. He also published many papers on meteorology, astronomy, terrestrial magnetism, etc.

**Quetta**, a town of Beloochistan, strategically important as being at the entrance to the Bolan Pass, and on the road from Candahar through the Pishin Valley to Shikarpoor on the Indus. It thus commands the southern route from India to Afghanistan. By treaty with the Khan of Kelat (1877), in whose territory it is, Quetta was furnished with a British garrison and strongly fortified. It contains extensive magazines of war material, and was in 1885 connected with the Indus by a line of railway. Quetta lies 5,500 feet above the sea level, and is surrounded by mountains from five to six thousand feet high.

**Quetzalcoatl**, the god of the air of the ancient Mexicans, who presided over commerce and the useful arts, and is said to have predicted the coming of the Spaniards to Mexico.

**Quezal**, a most beautiful Central American bird of the Trogon family. It is about the size of a magpie, and the male is adorned with tail feathers from 3 to 3½ ft in length, and of a gorgeous emerald color. These feathers are not strictly speaking the true tail feathers (the color of which is black and white), but are the upper tail coverts of the bird. The back, head (including the curious rounded and compressed crest), throat, and chest are of the same rich hue, the lower parts being of a brilliant scarlet. The female wants these long feathers, and is otherwise much plainer. The food of the quezal consists chiefly of fruits. It lives in forests of tall trees. There are several allied species of birds, but none with the distinctive feature of the quezal.

**Quezaltenango**, a town of Central America, in Guatemala, capital of a department of same name, with woolen manufactures and a considerable trade. It was founded by Alvarado in 1524. Pop. 23,574.

**Quibdo**, a town in the state Cauca, of the Republic of Colombia, South America, on the Alvalo. Pop. 6,856.

**Quibor** (kë'bor), a town of Venezuela, in the state of Lara, division Barquisimeto. Pop. 7,727.

**Quichua** (kë'chy-â), the name of a native race of South America, inhabiting Peru, parts of Ecuador, Bolivia, etc. With the Aymaras the Quichuas composed the larger portion of the population of the empire of the Incas. The Quichua language, which was formerly the state language of the Incas, is still the chief speech of Peru, of a large portion of Bolivia, of the part of Ecuador bordering upon Peru, and of the northern section of the Argentine Republic. It is one of the most beautiful and at the same time comprehensive tongues of America.

**Quicksand**, a large mass of loose or moving

## Quillai Bark

sand mixed with water formed on many sea coasts, and at the mouths of rivers, dangerous to vessels or to persons who trust themselves to it and find it unable to support their weight.

**Quillai Bark**, the bark of a South American tree belonging to the wing-seeded section of the Rosaceæ. It is used to make a lather instead of soap in washing silks, woolens, etc. It is called also *Quillaya bark*.

**Quillimane** (kil-i-mä'ne), a town in East Africa, in the Portuguese territory of Mozambique, unhealthily situated about 15 mi. above the mouth of the river of the same name (the northern branch of the Zambezi). It carries on a considerable trade in gold, ivory, wax, etc., and coal of good quality is reported to be plentiful. Pop. 3,500.

**Quillota** (kil-yō'tá), a town in Chile, in the province of Aconcagua, 23 mi. n.e. of Valparaíso. The copper mines in the vicinity are regarded as the richest in Chile. The town has suffered severely on different occasions from earthquakes. Pop. 48,737.

**Quiloa** (kēl'o-ā) (or Kilwa), a seaport of East Africa on the Zanzibar coast. Pop. 6,000.

**Quilon'**, a coast town in Madras, India, in the state of Travancore, 35 mi. n.w. of Trivandrum the capital, with a considerable export trade. Has barrack for European troop, hospital, and an Episcopal church. Pop. 13,588.

**Quin**, JAMES (1693-1766), an eminent actor, of Irish patronage, b. in London, d. at Bath. He made his first appearance on the stage at Dublin in 1714; shortly afterward he acquired celebrity as a tragic actor as well as in characters of comic and sarcastic humor, like Falstaff, Volpone, etc. He retained his pre-eminence until the appearance of Garrick in 1741. His last performance was Falstaff (1753), in which character he is supposed never to have been excelled.



Flowering Branch of Quince. a.—ripe fruit; b.—section of same.

boiled and eaten with sugar, or preserved in syrup, or made into marmalade.

## Quintana

**Quincey**, THOMAS DE. See *De Quincey*.

**Quincy**, Norfolk co., Mass., on sea coast, 8 mi. s.e. of Boston. Birthplace of John Hancock, John Adams, and John Quincy Adams. Railroad, N. Y., N. H. & H. R. Industries: granite quarrying and manufacturing, rivet and stud works, boot and shoe factory, etc. The town was first settled in 1625, incorporated as a town in 1792, and became a city in 1888. Pop. 1900, 23,899.

**Quincy**, Adams co., Ill., on the Mississippi River. Railroads: C. B. & Q.; Hannibal and St. Joseph; Quincy, Omaha & Kansas City; St. Louis, Keokuk & Northwestern; and the Wabash. Industries: flour mills, tobacco factories and breweries, iron foundries, stove works; leather board, paper, furniture, and trunks are also manufactured. Its river trade is very large. The state soldiers' and sailors' home, and Chaddock college are situated here. Pop. 1900, 36,252.

**Quincy**, JOSIAH (1772-1864), an American writer b. at Boston. Educated for the law, he made politics his profession, and was a member of Congress from 1804 to 1812. Then he was elected a member of the senate of the legislature of Massachusetts, a position which he held till 1821, in which year he held the office of speaker of the house. From 1823 to 1828 he was mayor of Boston and effected various important reforms. From 1829 to 1845 he was president of Harvard College. His principal works are: *History of Harvard University*; *Municipal History of the Town and City of Boston during Two Centuries*; *Life of John Quincy Adams*.

**Quin'ine**, a white, crystalline, alkaloid substance, inodorous, very bitter, and possessed of marked antifebrile properties. It is obtained from the bark of several trees of the order Cinchonaceæ, but perhaps the best is that from calisaya bark. It was discovered about 1820, and has entirely superseded the use of the bark itself in medicine, being most commonly used in the form of sulphate of quinine. The extraordinary value of quinine in medicine as a febrifuge and tonic has given rise to a large trade in Peruvian bark, and has caused the cinchona tree to be extensively planted in India and elsewhere. Quinine in small doses is stomachic, in large doses it causes extreme disturbance of the nerves, headache, deafness, blindness, paralysis, but seldom death.

**Quinoa** (kwi-nō-a), a South American plant, of which there are two cultivated varieties, one yielding white seeds, and sometimes called pettyrice, the other red. The white seeds are extensively used in Chile and Peru as an article of food in the form of porridge, cakes, etc. The seeds of the other variety, *red quinoa*, are used medicinally as an application for sores and bruises.

**Quintal**, a weight of 100 lbs. or thereby, used in different countries. The old French quintal was equal to 100 livres, or nearly 100 lbs. avoirdupois. The *quintal métrique* or modern quintal is 100 kilogrammes, or 220 lbs. avoirdupois.

**Quintana** (kin-tā'nā), MANUEL JOSÉ (1772-1857), Spanish poet, b. at Madrid. He studied

## Quintilian.

at Cordova and Salamanca, became an advocate, and filled various offices connected with government at different times. Almost all the manifestoes in the war against the French were composed by him; he also wrote a series of patriotic poems, entitled *Odas a España Libre*. He was latterly appointed director general of education, and became a senator. His poetical, critical, and historical works are held in high estimation.

**Quintilian**, **MARCUS FABIVS QVINTILIANVS** (35-118 A.D.), a Roman rhetorician, b. at Calagurris (Calahorra) in Spain. He began to practise as an advocate at Rome about A.D. 69, and subsequently became a teacher of rhetoric. Some of the most eminent Romans were his pupils, and the Emperor Domitian bestowed on him the consular dignity. His work, *De Institutione Oratoria*, contains a system of rhetoric in twelve books, and includes some important opinions of Greek and Roman authors.

**Quintus Cala'ber** (or Smyrna'us), a Greek poet, author of a sort of continuation of the *Iliad* in fourteen books, a rather dull imitation of Homer. He probably flourished at Smyrna in the fourth century A.D.

**Quipo** (Quipu) (kwip'ō, kwip'ö), a cord about 2 ft. in length, tightly spun from variously colored threads, and to which a number of smaller threads were attached in the form of a fringe; used among the ancient Peruvians and Mexicans for recording events, etc. The fringe-like threads were also of different colors and were knotted. The colors denoted sensible objects, as white for silver, yellow for gold, and the like; and sometimes also abstract ideas, as white for peace, red for war. They constituted a rude register of certain important facts or events, as of births, deaths, and marriages, the number of the population fit to bear arms, the quantity of stores in the government magazines, etc.

**Quirinal**, one of the seven hills of ancient Rome. There is a palace here, begun in 1574, and formerly a summer residence of the popes, but since 1871 the residence of the king of Italy.

**Quiri'nus**, among the Romans, a surname of Romulus after he had been raised to the rank of a divinity. Hence *Quirinalia* a festival in honor of Romulus, held annually on the 13th day before the Calends of March, that is, the 17th of February.

**Quiri'tes**, a designation of the citizens of ancient Rome as in the civil capacity. The name of Quirites belonged to them in addition to that of Romani, the latter designation ap-

## Quorum.

plying to them in their political and military capacity.

**Quit-claim**, in law, signifies a release of any action that one person has against another. It signifies also a quitting of a claim or title to lands, etc.

**Quito** (kē'tō), the capital of Ecuador, in a ravine on the east side of the volcano of Pichincha, 9,348 ft. above the sea, a little to the south of the equator. Its streets, with the exception of four which meet in the large central square, are narrow, uneven, badly paved, and extremely dirty. The more important public buildings are the cathedral, several other churches and convents; the townhouse, courthouse, president's palace, the university, the episcopal palace, orphan asylum, and hospital. The manufactures consist chiefly of woolen and cotton goods. From the want of good roads and railways trade is much hampered. Quito was originally the capital of a native kingdom of the same name, but the modern town was founded by the Spaniards in 1534. It has repeatedly suffered from earthquakes. Pop. 80,000, largely consisting of half-breeds and Indians.

**Quittah**, a town on the coast of West Africa, in the British colony of the Gold Coast. Pop. 5,000.

**Quoits**, a game played with horseshoes, or a flattish ring of iron, generally from 8½ to 9½ in. in external diameter, and between 1 and 2 in. in breadth. It is convex on the upper side and is slightly concave on the under side, so that the outer edge curves downward, and is sharp enough to cut into soft ground. The game is played in the following manner: Two pins, called hobs, are driven into the ground from 18 to 24 yds. apart; and the players, who are divided into two sides, stand beside one hob, and in regular succession throw their quoits (of which each player has two) as near the other hob as they can, giving the quoit an upward and forward pitch with the hand and arm, and communicating to it a whirling motion, so as to make it cut into the ground. The side which has the quoit nearest the hob counts a point toward the game, or if the quoit is thrown over the hob, it counts two points.

**Quorum**, a term used in commissions, of which the origin is the Latin expression, *quorum unum A. B. esse volumus* ("of whom we will that A. B. be one"), signifying originally certain individuals, without whom the others could not proceed in the business. In legislative and similar assemblies a quorum is such a number of members as is competent to transact business.



# R

## Ra

**R** is the eighteenth letter of the English alphabet, classed as liquid and semi-vowel. In the pronunciation of Englishmen generally it represents two somewhat different sounds. The one is heard at the beginning of words and syllables, and when it is preceded by a consonant; the other, less decidedly consonantal, is heard at the end of words and syllables, and when it is followed by a consonant. In the pronunciation of many English speakers, *r*, followed by a consonant at the end of a syllable, is scarcely heard as a separate sound, having merely the effect of lengthening the preceding vowel; when it is itself final, as in *bear*, *door*, *their*, etc., it becomes a vowel rather than a consonant.

*The three Rs*, a humorous and familiar designation for *Reading*, *Writing*, and *Arithmetic*. It originated with Sir William Curtis, who, on being asked to give a toast, said, "I will give you *the three Rs*, *Writing*, *Reading* and *Arithmetic*."

**Ra** (more properly Rê), the name of the god of the sun among the ancient Egyptians. He is represented like Horus, with the head of a hawk, and bearing the disk of the sun on his head. *Tum*, *Harmachis*, and other gods are mere impersonations of the various attributes of Ra.

**Rabat'**, a maritime town in Morocco, in the province of Fez, on the Atlantic, at the mouth of the Buregreb, is surrounded with a wall flanked by numerous towers, and has a citadel and batteries. It has some manufactures (carpets, woollens, cottons, and leather) and considerable trade in wool and corn. Pop. 30,000. On the other side of the river mouth is the town of Sallee.

**Rabba**, a town of Western Soudan, in the kingdom of Gando, on the left bank of the Niger, some 350 mi. from its mouth, with a considerable trade in slaves and ivory, and manufactures of woollen. Pop. about 40,000.

**Rabbet**, in carpentry, a sloping cut made on the edge of a board so that it may join by lapping with another board similarly cut; also, a rectangular recess, channel, or groove cut along the edge of a board or the like to receive a corresponding projection cut on the edge of another board, etc., required to fit into it.

**Rabbi**, a title of honor among the Hebrews, corresponding nearly to the English *master*. There are two other forms of the title, *rabboni* and *rabbani*, the former of which is found in the New Testament. It is supposed that this title first came into use at the period immediately preceding the birth of Christ. In the time of our Lord it was applied generally to all religious teachers, and hence sometimes to Christ himself. Now the term *rabbi* or *rabin* is applied to regularly appointed teachers of Talmudic Judaism.

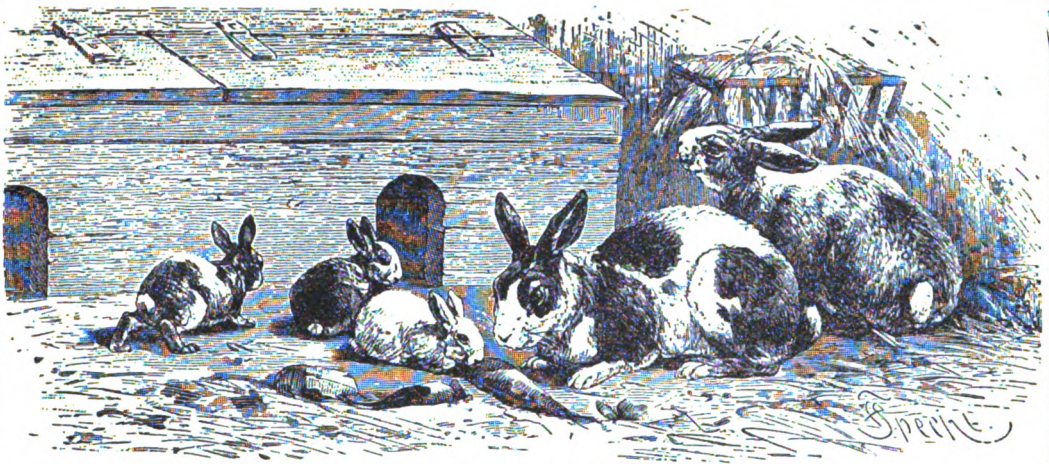
## Rabelais

**Rabbinic Hebrew**, that form of Hebrew in which the Jewish scholars and theologians of the Middle Ages composed their works. Grammatically it differs but little from the ancient Hebrew, but in many cases new meanings are attached to Hebrew words already in use; in other cases new derivatives are formed from old Hebrew roots, and many words are borrowed from the Arabic. The rabbinical literature is rich and well repays study.

**Rabbit**, a genus of rodent mammals, included in the family Leporidae, to which also belong the hares. It is of smaller size than the hare, and has shorter ears and hind legs. The rabbit's fur in its native state is of a nearly uniform brown color, while under domestication the color may become pure white, pure black, piebald, gray, and other hues. The texture of the fur also changes under domestication. The rabbit is a native of all temperate climates, and in its wild state congregates in "warrens" in sandy pastures and on hill slopes. Rabbits breed 6 or 7 times a year, beginning at the age of 6 months, and producing from 5 to 7 or 8 at a birth. They are so prolific that they may easily become a pest, as in Australia, if not kept in check by beasts and birds of prey. They feed on tender grass and herbage, and sometimes do great damage to young trees by stripping them of their bark. They grow exceedingly tame under domestication, and sometimes exhibit considerable intelligence. Rabbits are subject to certain diseases, such as rot—induced probably by damp and wet—parasitic worms, and a kind of madness. The skin of the rabbit is of considerable value; cleared of hair, it is used with other skins to make glue and size. The fur is employed in the manufacture of hats, and to imitate other and more valuable furs, as ermine, etc.

**Rabelais** (râb-lâ), FRANÇOIS (1495–1553), a humorous and satirical French writer. He went to Montpellier, where he studied medicine, having become a secular priest; he was admitted bachelor in 1530, and for some time successfully practised and taught. In 1532 he went to Lyons, where he published a work of Hippocrates and one of Galen, and the first germ of his *Gargantua*. Soon after its publication Rabelais accompanied Jean du Bellay on an embassy to Rome. On his return to France he went first to Paris; but not long after he is found once more at Lyons, where the *Gargantua*, as we now have it, first saw the light. In 1536 Rabelais was again at Rome, and on this occasion he obtained from the pope absolution for the violation of his monastic vows, and permission to practise medicine and to hold benefices. In 1537 he took his degree of Doctor of Medicine at Montpellier, and lectured on Hippocrates. Probably





1. Common Domestic Rabbit.

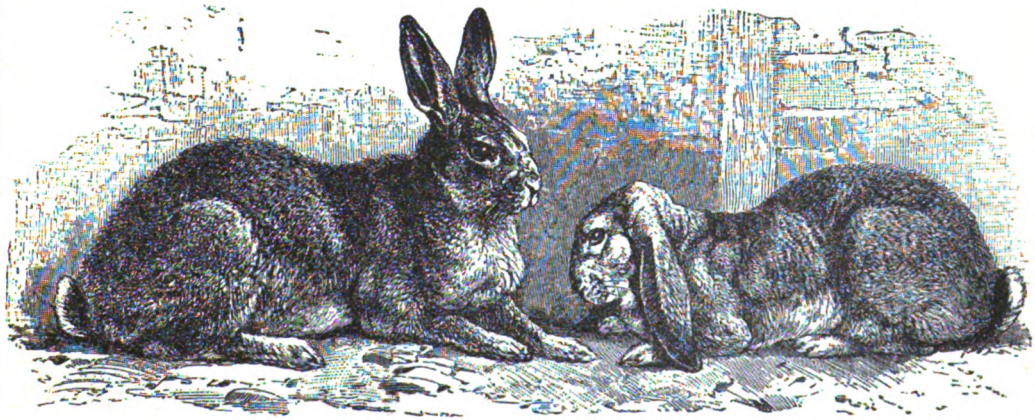


2. White Silk-haired Rabbit.

3. Silver Rabbit.

5. Japanese Rabbit.

4. Chinese or Russian Rabbit



6. Giant Rabbit.

7. Ram-headed Rabbit.



## Raccoon

he was in Paris in 1546, when the third book of his *Gargantua and Pantagruel* appeared, but during most of 1546 and part of 1547 he was physician to the town of Metz. About 1550 Rabelais was appointed to the cure of Mendon, but he resigned the position in 1552, and died a year later, according to most authorities. He left the whole of the fifth book of his remarkable romance in manuscript. By many Rabelais has been set down as a gross buffoon, and there is much in his writings to justify the harsh judgment, though we must remember what was the taste of his times. As regards the purpose of his work, many have looked upon Rabelais as a serious reformer of abuses, religious, moral, and social, assuming an extravagant masquerade for the purpose of protecting himself from the possible consequences of his assaults on established institutions.

**Raccoon**, an American plantigrade carnivorous mammal, the common raccoon being the *Procyon lotor*. It is about the size of a small fox, and its grayish-brown fur is deemed valuable, being principally used in the manufacture of hats. This animal lodges in hollow trees, feeds occasionally on vegetables, and its flesh is palatable food. It inhabits North America from Canada to the tropics. The agouti or crab-eating raccoon is found farther south on the American continent than the above species, and is generally larger. Although denominated "crab-eating" it does not appear to be any more addicted to this dietary than the common species.

**Rachel** (rá-shell), MADEMOISELLE (ELIZABETH RACHEL FELIX) (1821-1858), a French tragedienne, of Jewish extraction. For a time she gained her living by singing in the streets of Lyons, but being taken notice of she was enabled to receive a course of instruction at the Conservatoire, and made her *début* in 1837 on the stage of the Gymnase at Paris. She attracted no special attention, however, until the following year, when, transferred to the Théâtre Français, she took the Parisian public by storm by the admirable manner in which she impersonated the classic creations of Racine and Corneille. Her renown continued to increase, and for many years she reigned supreme at the Théâtre Français, making also tours to the provincial towns of France, to Belgium, etc. Later she visited America.

**Racine**, Racine co., Wis., on Lake Michigan, 63 m. n. of Chicago. Railroads: C. M. & St. P., C. & N. W., and M. R. & K. Electric. The chief industries are threshing machine works, iron foundries, woolen mills, wagon, trunk, school furniture, farm implement, rubber clothing and malted milk factories. The surrounding country is devoted mainly to dairying. The town was settled in 1834, and became a city in 1848. Pop. 1900, 29,102.

**Racine** (rá-sen), JEAN BAPTISTE (1639-1699), a distinguished French dramatist, b. at La Ferté-Milon (Aisne). His French tragedy, the *Thebaïde*, or *Les Frères Ennemis*, was performed by Molière's troupe at the Palais-Royal in 1664, as was also his next, *Alexandre*, in 1665. His first masterpiece was *Andromaque*, which on

## Radetzky

its performance at the Hôtel de Bourgogne, in 1667, produced a profound impression. The immediate successor of *Andromaque* was *Les Plaideurs* (1668), a witty and delightful imitation of the *Wasps* of Aristophanes. In 1673 he obtained a seat in the French Academy. His withdrawal from the theater in 1677 was partly due to chagrin at the success of a hostile party of theatrical critics who applauded a writer now never heard of at the expense of Racine. At this period his friends persuaded him to marry, and soon after he was appointed, along with Boileau, historiographer to the king, whom he accompanied in his campaign to Flanders. Besides his dramas Racine is the author of epigrams, odes, hymns, etc.

**Rack**, an instrument for the judicial torture of criminals and suspected persons. It was a large open wooden frame within which the prisoner was laid on his back upon the floor, with his wrists and ankles attached by cords to two rollers at the end of the frame. These rollers were moved in opposite directions by levers till the body rose to a level with the frame; questions were then put, and if the answers were not deemed satisfactory, the sufferer was gradually stretched till the bones started from their sockets. It was formerly much used by civil authorities in the cases of traitors and conspirators; and by the members of the Inquisition, for extorting a recantation from imputed heretical opinions. The rack was introduced into England in the reign of Henry VI, and although declared by competent judges to be contrary to English law, there are many instances of its use as late as the time of Charles II.

**Radcliffe**, ANN WARD (1764-1823), novelist b. in London. She married at the age of twenty-three William Radcliffe, afterward editor and proprietor of the *English Chronicle* newspaper. She published in quick succession *The Castles of Athlin and Dunbayne*, a Highland story; *The Sicilian Romance*; and *The Romance of the Forest*. Her masterpiece is considered to be the *Mysteries of Udolpho* (1794), which was long very popular.

**Radcliffe College**, an educational institution for women, founded at Cambridge, Mass., in 1879, by the Society for the Collegiate Instruction of Women. It was at first known as the Harvard Annex, though it had no official relations with Harvard University until 1894, when by act of the General Court of Mass. its name was changed to Radcliffe College, in honor of Anne Radcliffe, the first woman to give a money endowment to Harvard. The requirements for admission and for degrees are identical with those of Harvard College and the courses of instruction and the instructors are for the most part the same. In 1904 the college had a faculty of 108, an attendance of 443 and a library of 18,700 volumes. The dean is Le Baron R. Briggs.

**Radetzky**, JOSEPH WENCESLAUS, COUNT (1766-1858), a famous Austrian soldier, b. at Trebnitz, in Bohemia. Commencing his career in a Hungarian regiment of horse in 1784, he fought in most of the campaigns in which



## Radiata

Austria was engaged from that date up to the time of his death, including Hohenlinden, Wagram, and Leipsic. But his most signal services were in Italy, whither he was called by the commotions following the French Revolution of 1830, and where a great part of his subsequent life was spent.

**Radia'ta**, the name given by Cuvier to the fourth great division of the animal kingdom, including those animals whose parts are arranged round an axis, and display more or less of the "rayed" appearance or conformation. In modern zoology Cuvier's division has been abolished, and the radiata have been divided into the Protozoa, Cœlenterata, and Annuloica or Echinozoa.

**Radical** (from *L. radix*, root), the name adopted by a large section of the Liberal party in Britain, which desires to have all abuses in the government completely rooted out, and a larger portion of the democratic spirit infused into the constitution. The term was first applied as a party name in 1818 to Henry Hunt, Major Cartwright, and others, who wished to introduce radical reform in the representative system.

**Radiola'ria**, an order of Protozoa of the class Rhizopoda, characterized by possessing a central mass of sarcode enclosed in a porous, membranous, or chitinous capsule which is surrounded by a sarcode envelope. They often possess a siliceous or flinty test or siliceous spicules, and are provided with *pseudopodia*, or prolongations of their soft protoplasmic bodies, which stand out like radiating filaments, and occasionally run into one another. The Polycystina belong to the Radiolaria.

**Radish**, a well known cruciferous plant, unknown in a wild state. The tender leaves are used as a salad, in early spring, the green pods are used as a pickle, and the succulent roots are much esteemed.

**Radium**, a metal whose compounds possess the property of emitting rays of light, heat and chemical action. Radium was discovered by Professor Curie and his wife, Madame Curie, at the Industrial School of Physics and Chemistry in Paris. In 1896 it was found that uranium and all its compounds continually emit radiations having a penetrating power similar to the X-rays. Professor and Madame Curie followed this discovery with a series of experiments on an ore of uranium commonly known as pitch-blende. A pure radium chloride was obtained in 1902.

Radium emits light and heat without loss of weight or strength. A small tube of it when held near the page emits enough light to enable one to read, and it maintains a temperature of 2.7° F. above that of the surrounding atmosphere. Its actinic rays produce sores which are difficult to heal, but in a mild form they have a curative effect upon lupus. The properties of radium are not well understood. It is obtained only in small quantities. Its value is three thousand times that of gold.

**Raff, JOACHIM** (1822-1882), musical composer, b. in Switzerland, of German parents. He was encouraged by Mendelssohn and Liszt, and

## Ragwort

having gone in 1850 to live at Weimar, in order to be near Liszt, his opera *König Alfred*, was first performed there at the Court Theater. His *Dame Kobold*, a comic opera was produced in 1870, but his reputation rests chiefly on his symphonies (*Im Wald*, *Lenore*, etc.).

**Raffia**, a palm fiber, imported from Madagascar. It is peeled from both sides of the long leaves of an African palm and is imported in the form of ribbons. It is used in the manufacture and trimming of ladies' hats and by nurserymen for tie material. Of late it has come to be considerably used with splints of rattan in the making of fancy baskets and other articles by students in our manual training schools. The fiber is very easily dyed and can be purchased in several colors.

**Raft**, a sort of float formed by a body of planks or pieces of timber fastened together side by side so as to be conveyed down rivers, across harbors, etc.; also any rough floating structure, such as those often formed in cases of shipwreck of barrels, planks, etc.

**Raglan, FITZROY JAMES HENRY SOMERSET, LORD** (1788-1855), an English field officer, the son of the fifth Duke of Beaufort. He entered the army in 1804 and later became military secretary to the Duke of Wellington, serving in the Peninsular War and in the Battle of Waterloo. In 1852 he was made a baron and two years later was put in command of the forces of England against Russia in the Crimean War.

**Ragout** (ra-gö';) (French, ragoût), meat or fish stewed with vegetables, and highly seasoned to excite a jaded appetite.

**Rags**, though valueless for most purposes, are yet of great importance in the arts, particularly in paper-making. Besides the rags collected in the U. S., the article is imported in large quantities from various foreign countries. Woolen rags, not being available for paper, are much used for manure; but those of a loose texture, and not too much worn, are unraveled by means of machinery, and mixed up with good wool, to form what is known as *shoddy*, with which cheap woolen goods are made; while the refuse is pulverized and dyed various colors, to form the flock used by paper-stainers for their flock-papers.

**Ragstone**, a stone of the siliceous kind, so named from its rough fracture. It effervesces with acids, and gives fire with steel. It is used for a whetstone without oil or water for sharpening coarse cutting tools. The term is also applied to certain limestones which contain many fragments of shells resembling rags.

**Ragu'sa**, a town of Sicily, 29 mi. w.s.w. of Syracuse, on the right bank of the river of its name, divided into Upper and Lower Ragusa. It has considerable manufactures of silk stuffs, and a trade in corn, wine, oil, etc. Pop. 30,443.

**Ragwort** (Ragweed), the popular name of various species of composite plants of the genus *Senecio*, found in Europe, so called from the ragged appearance of the leaves. The common ragwort is a perennial with golden yellow flowers, growing by the side of roads

## Ralatea

and in pastures. It is a coarse weed, refused or disliked by horses, oxen, and sheep, but eaten by hogs and goats.

**Raiate'a**, one of the Society Islands in Southeastern Polynesia. Area 75 sq. mi.; pop. 1,400, who have been converted to Christianity by English missionaries, and are governed by their own chiefs.

**Raibolini** (rī-bo-lō'nē), FRANCISCO DI MARCO DI GIACOMO, usually called FRANCISCO FRAN- CIA, a famous Italian painter, engraver, medalist, and goldsmith, was b. at Bologna about the middle of the fifteenth century. He excelled particularly in Madonnas, and executed a number of admirable frescoes in the church of St. Cecilia at Bologna, but his most famous work is an altar-piece exhibiting the Madonna, St. Sebastian, etc., in the church of St. Giacomo Maggiore in the same city. Three works of his are in the British National Gallery. He was also celebrated as a portrait painter.

**Raikes**, ROBERT (1755-1811), English philanthropist, b. at Gloucester. He was proprietor of the *Gloucester Journal*, and originated the system of Sunday-schools by gathering together a number of street children for secular and religious training.

**Rail**, the common name of the Rallidæ, a family of grallatorial birds comprehending the



Water Rail.

rails proper, the coots, water hens, and crakes. They are characterized by possessing a long bill, which is more or less curved at the tip and compressed at the sides, by having the nostrils in a membranous groove, the wings of moderate length, the tail short, the legs and toes long and slender, the hind toe placed on a level with the others. Most of the members of the family are aquatic or frequent marshes; but some, as the crakes, frequent dry situations. The principal species of the genus *Rallus* are the water rail of Europe about 11 in. in length, of an olive-brown color, marked with black above, and of a bluish-ash color beneath, with white transverse markings on the belly, much esteemed for the table; the Virginian rail, somewhat smaller than the water rail of Europe; and the great-breasted rail or fresh water marsh hen, about 20 in. long, which inhabits the marshes of the Southern states. The land rail, so named, is the corn crake.

**Railroads**.—The railroad mileage of the world in 1903 was approximately 505,000 mi., of which 203,000 mi. were in the U. S. For the whole American continent, the mileage

## Railroads

was 259,647 mi., of which 33,067 mi. were in S. America, 18,294 mi. in British America, 10,500 in Mexico and Central America and the balance in the United States. In the whole of Europe there were 180,000 mi. Germany led with 32,753 mi.; Russia second with 31,945 mi.; France third with 26,500 mi.; Austro-Hungary fourth with 22,900 mi.; Great Britain and Ireland fifth with 22,100 mi.; then came Italy, 9,852 mi.; Spain, 8,315 mi.; Sweden and Norway, 8,342 mi.; Denmark, 1,865 mi.; Portugal, 1,476 mi.; Switzerland, 2,490 mi.; Turkey, 2,469 mi.; Greece, 903 mi. Asia as a consequence of activity on the trans-Siberian railroad, in British India and in Japan, in the last few years has seen a remarkable increase in railroad mileage and the total in 1903 amounted to 37,469 mi. Of this total 23,758 is in British India, 3,661 in Japan, and 3,852 to Siberia. Dutch India has 1,301 mi., and Asia Minor, 1,715 mi. In Africa there were about 12,501 mi. of railroad and in Australasia about 16,000 mi.

The following table shows the growth of railroads in the United States during the period 1876-1903. (Taken from Poor's Manual.)

	1876.	Jan. 1, 1903.
Mileage .....	76,808	203,132
Capital invested.....	\$4,658,000,000	\$13,311,199,316
Earnings (gross).....	\$503,000,000	\$1,720,814,900
Number locomotives.....	15,000	41,626
Number passenger cars..	14,000	27,364
Number freight cars.....	384,000	1,503,949
Number employes.....	370,000	1,189,315
No. passengers carried...		655,130,236
Tons of freight moved...		1,192,136,510
Highest speed .....		109.35 mi. pr. hr.
Average speed .....	20 to 30 mi.	40 to 50 mi.

**Railroad or Railway**.—The terms are synonymous, but in the U. S. the word "railroad" is applied, not alone to the roadway with its parallel rails used for the support of locomotives and cars in the transportation of freight and passengers, but it is applied to the company organized to operate the railroad. A "railway" is a way or roadbed, on which is laid a structure of metal rails, which provide a smooth, level way for the wheels of the locomotives and cars used in the operation of a railroad.

**History of Railways**.—Railways were known in the days of the Romans, and the tracks were composed of two lines of dressed stones, laid end to end, so as to provide a continuous stone way. Railways were used in England as early as 1602. Such were made of wooden rails, or beams, laid down for the wheels of the wagons used to carry coal from mines. In 1715 flat strips of iron were nailed to the wooden rails as a wearing surface. In 1767 cast-iron rails were introduced, and two years later flat cast-iron rails, with an upright fin or flange to confine the wheels to the track, were invented. In the latter part of the eighteenth century, wrought iron bars, laid on wooden ties, were laid, and shortly after 1820, the rolled rail, formed in a rolling mill, was invented.

Thus the railway was in use long before the

locomotive was born. The railway was used chiefly in coal mines and stone quarries, the wagons or cars being hauled by horses. The locomotive was a development of steam carriages to be used on common roads. Sir Isaac Newton, as far back as 1680, outlined a plan for a land carriage to be driven by steam. This "dream" of the philosopher and scientist had four wheels and a boiler from which the steam was to be exhausted through a pipe in the rear; the motive power to be the reaction of the steam.

So far as it is definitely known, the first practicable steam land carriage was built and used by Nicholas Cugnot, a Frenchman, in 1769. The original Cugnot steam carriage is preserved in Paris, but a full-sized model of it is in the Field Columbian Museum, Chicago. Cugnot built a vehicle which had a copper boiler, globular in form, and a pair of single acting, 13-inch steam cylinders, which communicated power to the single driving wheel. It was intended for the transportation of artillery. It was tested, and made several trial trips, but the boiler was too small, and the steering device was imperfect. In one sense of the word, the Cugnot steam road carriage was the first locomotive.

In the early part of the nineteenth century, mechanical engineers and scientists in England entered into a lively competition, inventing and building steam road carriages to be run on common roads. The craze, for it grew to reach that state of activity, began with the invention of Cugnot, and extended well into 1820-30. It spread to America, and Oliver Evans of Philadelphia, in 1787, obtained a patent in Maryland for the exclusive right to make steam carriages for roads and railways. It was not until 1800 that he found time to give his attention to the construction of a steam land carriage. He built a high-pressure, double-acting steam engine, and this fact gave America the pretext to claim that an American was the inventor of the system of high pressure in steam engines. England, however, claims the honor for Trevethick, who built a high-pressure engine for the propulsion of a steam road engine. It is claimed that Trevethick obtained a hint, which enabled him to claim the invention of high-pressure steam engines, from plans sent to England by Evans in 1787 to secure patents. Evans built a steam dredging machine, mounted on a flat boat in 1804. The machine was built in his shop, and in order to transport it to the river, he placed wheels under the boat, and caused the steam engine of the machine to propel the "Orukter Amphibolos," as he called it, to the river. This was the first steam-propelled vehicle to move in America.

In 1811, an Englishman named Blenkinsop, built a locomotive to haul coal cars on a tramway. A rack was laid at the side of the track, and a spur wheel on the locomotive engaged with this rack and thus pulled its load. This is regarded as the first railroad locomotive. In 1812 it was proved that a traction could be obtained without the use of spur wheels and

rack rails, and a locomotive, with eight wheels, driven by gearing, was patented to run on smooth rails. In 1813, William Hedley built the "Puffing Billy," a locomotive with eight wheels. It was in service until 1862, when it was placed in the British museum.

George Stephenson, b. in England, June 9, 1781, made the locomotive for railroads a practical success. In 1813 he was an engineer of a coal mine, and saw the Blenkinsop engine. He found a patron in Lord Ravensworth, who advanced him money to build an improvement on the Blenkinsop locomotive. It had been proved that a smooth wheel would not slip on a tram rail, hence Stephenson left the rim of his drivers smooth. In 1814 his first engine was placed in service on the Killingworth railway, and drew eight loaded coal wagons of thirty tons' weight at a rate of four miles an hour, on a grade of one foot in 450. In this locomotive he put the steam blast, which aided combustion to such an extent that his engine was able to do twice the work of other locomotives built at that time. In 1815 he patented a second engine in which the steam blast was improved, and connecting rods were first used on the driving wheels.

In 1825 a railway was opened between Stockton and Darlington, England, and Stephenson became engineer of the road, but at the same time he was engaged in the manufacture of locomotives in Newcastle-on-Tyne. In the same year he was employed as engineer of the Liverpool & Manchester Railroad, the first railroad of importance to be built. He surveyed the route, and in 1826 Parliament granted the road a charter. When the line was built, the directors of the road offered a prize of 500 pounds for the best locomotive which could be produced not later than Oct. 1, 1829.

The conditions under which the competition was to be carried on are interesting, in that they constitute what might be called the specifications of the ideal locomotive of that day. They were as follows:—

1. The engine must effectually consume its own smoke.
2. The engine, if of six tons' weight, must be able to draw after it, day by day, twenty tons' weight (including the tender and water tank) at 10 mi. an hour, with a pressure of steam on the boiler not exceeding 50 lbs. to the sq. in.
3. The boiler must have two safety valves, neither of which must be fastened down, and one of them be completely out of control of the engineman.
4. The engine and boiler must be supported on springs, and rest on six wheels, the height of the whole not exceeding fifteen feet to the top of the chimney.
5. The engine, with water, must not weigh more than six tons; but an engine of less weight would be preferred on its drawing a proportionate load behind it: if of four and a half tons, then it might be put on only four wheels. The company to be at liberty to test the boiler, etc., by a pressure of 150 lbs. to the sq. in.
6. A mercurial gauge must be affixed to the



## Railroads

machine, showing the steam pressure above 45 lbs. to the sq. in.

7. The engine must be delivered, ready for trial, at the Liverpool end of the railway, no later than Oct. 1, 1829.

8. The price of the engine must not exceed 500 pounds.

The test was made Oct. 6, 1829, with four engines as competitors. They were the *Novelty*, the *Sanspareil*, the *Rocket*, and the *Perseverance*. The trial track was 2 mi. in length, and level. The *Novelty* weighed a little over 6,000 lbs., with a blast furnished by bellows. In the final test the *Novelty* performed excellent work, making 24 mi. an hour, but a pipe burst, and it was forced out of the competition. The *Sanspareil* made an average speed of 14 mi. an hour, but a water-pipe burst before the trial was over. The *Perseverance* could make but 6 mi. an hour. The *Rocket* averaged a speed of 15 mi. an hour, but, at a certain period of the test, an average of 29 mi. an hour was made, and the prize was awarded to Stephenson.

The *Rocket* weighed a few hundred pounds over four tons, with its tender, water, and coke. It had two loaded carriages attached to it weighing about nine and one half tons. The average consumption of coke per hour during the test of the *Rocket* was 217 lbs.

The first fatal accident due to the operation of a steam locomotive, occurred Sept. 15, 1829, when the Liverpool & Manchester railroad was opened. Mr. Huskisson, Home Secretary in the British Cabinet, was knocked down by the *Rocket*, the wheels passing over his legs. He was placed on board the *Northumbrian*, another engine, driven by George Stephenson himself, who speeded the locomotive 15 mi. in 25 minutes, at the rate of 35 mi. an hour, to Eccles, where the injured man died that night. It is worthy of note that the *Rocket*, after it had been sent to the coal mines, demonstrated that it could make 60 mi. an hour.

**Railroads in the U. S.**—The first railway to be built in the U. S. was a short line, on which cars were drawn by horses, used for conveying stone to the Bunker Hill monument. This was built in 1826. In the fall of 1827, the Delaware & Hudson Canal Co. began building the Carbondale Railroad from Honesdale, Pa., to coal mines belonging to the Delaware & Hudson Canal Co. at Carbondale, 16 mi. distant. The line was completed and opened for business two years after or thereabouts; the exact date is a matter of uncertainty. Horses and stationary engines were used to haul the coal cars. Carbondale Railroad is noted because on its rails the first locomotive ever used in the U. S. was placed in service.

This locomotive was the *Stourbridge Lion*, built in Stourbridge, England, by Foster, Rastrick & Co. The order for this locomotive was taken to England by Horatio Allen, who has gone down in railroad history as the first man to run the first locomotive in the U. S. Mr. Allen was commissioned by the Delaware & Hudson Canal Co. to go to England to buy rails for the Carbondale Railroad, and three

## Railroads

locomotives. This was in 1829, a year before the competitive trial of locomotives on the Liverpool & Manchester Railway. Mr. Allen, after examining the different types of locomotives in England, decided that the multi-tubular boiler was best suited for locomotives, and he gave Foster, Rastrick & Co. an order for a locomotive with flues of comparatively large size. The order for the other two engines was given to Stephenson & Co., the specifications calling for boilers with small tubes.

The *Stourbridge Lion* was shipped to the U. S. and taken to Honesdale, Pa., where it was put on the rails of the Carbondale Railroad and tried Aug. 9, 1829, with Mr. Allen as engineer. The Stephenson locomotives were built on the *Rocket* plan, and shipped from England to New York, but were never sent to the Delaware & Hudson Canal Co.

The first railroad built in the U. S. for the purpose of transporting freight and passengers was the Baltimore & Ohio. Construction began in 1828, and the laying of rails began in 1829. In May, 1830, the first section or division, from Baltimore to Ellicott's Mill was opened. A scarcity of cars postponed the beginning of regular passenger business until the following July. Up to 1832, horses were employed to haul cars. In 1830, however, a little locomotive, built by Peter Cooper, made a trial trip on the tracks of the Baltimore & Ohio Railroad, but the locomotive, which was no larger than the modern handcar, was not a success. The *Best Friend*, built by the West Point foundry in 1830 for the South Carolina Company was the first locomotive built in the U. S. for practical work. In 1831 this company had another locomotive, *The South Carolina*, designed by Horatio Allen, built by the West Point foundry. The *DeWitt Clinton*, the third locomotive made by the West Point foundry, was built for the Mohawk & Hudson Railroad, and the first excursion trip was made by passengers Aug. 9, 1831, from Albany to Schenectady, N. Y. In the same year, in August, the locomotive *John Bull*, built by George and Robert Stephenson at their shops at Newcastle-upon-Tyne, England, was brought to Philadelphia for the Camden & Amboy Railroad.

From 1830 to 1835 railroad building in the U. S. was active, for of the 1,600 mi. of railroad in operation in the world in 1835, more than half the mileage was in the U. S. Of this mileage in the U. S., the Baltimore & Ohio had 115 mi.; the railroads in Pennsylvania had an aggregated length of 200 mi.; Massachusetts about 100 mi.; South Carolina, 137 mi.; New York and New Jersey, 100 mi. each; and Virginia about 50 mi. The Philadelphia & Reading, which was chartered in 1833, opened for business in 1838. Regular communication between New York and Philadelphia was established in 1839. This established railroad communication between New York and Baltimore, for the Philadelphia, Wilmington & Baltimore had been opened in 1838. In 1840, railroads connected Fredericksburg, Richmond, and Wilmington.

## Railroads

When the Charleston & Hamburg, in South Carolina, was opened in 1833, with a mileage of 137 mi., it was the longest line of railroad in the world under one management. In 1842 the New York Central was opened to Utica, and in the same year the Boston & Albany was completed. Through rail communication between Cincinnati and Lake Erie was established in 1848, and in that year, the Pennsylvania Railroad, the beginning of the great Pennsylvania system was chartered. In 1849 the Delaware, Lackawanna & Western, one of the most important coal roads in the world, was organized. In 1850 the Louisville & Nashville was chartered, one of the first of the important roads to be built south of the Ohio River. The main line of the Erie was opened through its entire length in 1851, but the Erie system, as it stands today, was not organized until 1895. The Cleveland, Columbus & Cincinnati line was opened in 1851, and the next year the line between Cleveland and Pittsburg was made. In 1852 the Michigan Central and the Michigan Southern lines were opened, and in 1853 the connecting link between Cleveland and Toledo was opened, thus securing through rail communication with Chicago. The opening of the Chicago & Rock Island between Chicago and the Mississippi River, in 1854 established through rail communication between the Atlantic Ocean and the Mississippi River. In 1855 a number of important lines were opened; the Chicago & Galena (the parent of the Chicago & Northwestern system), the Chicago & Alton; the Chicago, Burlington & Quincy, and the Illinois Central. In that year St. Louis and Cincinnati were joined by the Ohio & Mississippi. In 1858 the Hannibal & St. Joseph reached the Missouri River. The Louisville & Nashville was opened between those cities in 1859.

At the beginning of the Civil War, in 1861, there were 29,739 mi. of railroad in the U. S., and during the war, an average of only 651 mi. of railroad a year were built, bringing the total in 1865 to 32,996 mi. After the close of the war railroad building began again, and on May 10, 1869, the "golden spike" which completed the first trans-continental railroad line and established all-rail communication between the Atlantic and Pacific oceans, was driven, with imposing ceremonies. This important event was the junction of the Union Pacific, which had been chartered by Congress in 1863, and the Central Pacific, at Promontory Summit, Utah, 1,084 mi. w. of Omaha, 690 mi. e. of San Francisco. Five days after, through trains on the trans-continental line were put into service. In 1882 the Southern Pacific furnished another trans-continental route by way of New Orleans; the Atchison, Topeka, & Santa Fé completed a Pacific coast connection through the belt of country lying between the Southern Pacific and the Union Pacific. In 1883 the Northern Pacific was completed, and in June, 1893, the Great Northern dispatched its first through train to Seattle on the Pacific coast.

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In 1869 the New York & Hudson River system was formed by consolidation, and this marked the beginning of the railroad systems of the U. S. The Lake Shore & Michigan Southern was formed by consolidation of several roads in 1869. In 1870 the Pennsylvania company was organized to operate the lines of the Pennsylvania system west of Pittsburg. In 1874 the Chicago, Milwaukee & St. Paul system was formed. In 1875 the Chicago, Burlington & Quincy system was formed. The Missouri Pacific system had its beginning in 1880, and that same year the grouping of several railroads formed the Union Pacific system. The Canadian Pacific was organized in 1881. In 1888 the Chesapeake & Ohio system was formed; in 1889 the Wabash system; 1890 the Boston & Maine; 1894 the Southern Pacific system; 1895 New England system; 1895 Atchinson, Topeka & Santa Fé reorganized into the present system; 1895 Central of Georgia organized; 1895 Erie system. Since 1895 most of the great railroads of the U. S. have loosely organized into groups, owned or controlled by a few great financial interests. The leading groups are the Vanderbilt (19,500 mi.), including the N. Y. Cent. and Hudson R., Mich. Cent., Lake Shore and Mich. Southern, C. & N. W., "Nickel Plate," etc.; the "Hill-Morgan" system (20,500 mi.), with the Northern Pacific, Great Northern and the C. B. & Q.; the Gould system (13,795 mi.), including the Erie and the Wabash; the Harriman group (18,800 mi.), viz., Ill. Cent., Union Pacific, Chicago and Alton, Southern Pacific and others.

*Organization of an American Railroad.*—The stockholders of a railroad corporation elect a board of directors, and thus concentrate delegated authority on a few men. The board of directors elect a president, generally the executive head of the corporation, one or more vice presidents, a secretary, and treasurer.

In general, on railroads of the U. S., the president is the executive head; vice presidents are placed in charge of special departments, but in such positions they are assistants to the president. The general manager of the railroad sometimes is also the president, or he may be one of the vice presidents, but in general he is not an officer of the directory, but is appointed to the position, and may be removed by the president. The general manager has charge of the departments relating to the physical care of the properties of the railroad.

The physical departments of a railroad are each in charge of an official who is held accountable by the general manager for the conduct and maintenance of his particular department. The chief engineer, or superintendent of roadway, has charge of the maintenance of the tracks, bridges, buildings, etc. Under him is a force of assistant engineers. The roadmaster is in charge of that subdivision of the engineering department which relates to bridges and roadway, and under the roadmaster are supervisors of bridges and supervisors of roads, assigned to each division of the railroad. A supervisor of bridges has

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charge of "bridge gangs," each with its foreman, and composed of carpenters, iron workers, masons, and laborers. The supervisor of road has his division divided into sections, each section from 4 to 8 mi. in length, and on each section is a section foreman, the head of the section gang, composed of track walker, wood and water tenders, and laborers.

The superintendent of machinery, sometimes called superintendent of motive power, has charge of the construction and maintenance of the rolling stock of the railroad; locomotives and cars. His department is divided between a master mechanic, who has charge of locomotives and machine shops, and a master car builder who has charge of the car shops. The engine men (locomotive engineers and firemen), foremen of machine shops, mechanics and machinists, "hostlers" and cleaners in the round houses, etc., are under the master mechanic. The master car builder has charge of the shops where cars are built and repaired, and also of the car inspectors who prevent defective cars from going into trains at central and junction points.

The superintendent of transportation has charge of the movement of trains. He makes all time schedules and under him are the train masters; train dispatchers, telegraph operators, conductors, and trainmen.

The car accountant keeps track of all cars belonging to the company, whether on the lines of the owner's railroad or on the lines of foreign roads. He also keeps records of the locations and movements of foreign cars on the railroad. The records are made up from daily reports from freight and passenger conductors, and by a system of interchange reports from car accountants of other roads. He has "lost car agents" who travel constantly, searching for and locating missing cars.

The traffic manager has charge of the freight and passenger business so far as it relates to fixing freight and passenger rates, soliciting business and advertising special trains and excursions. Under him are the general freight and general passenger agents, with their assistants, traveling agents, local agents, rate and division clerks, and claim agents. Each division of the road has its superintendent, who is under the general superintendent, who in turn reports direct to the general manager. The division superintendent exercises general supervision of everything on his particular division, and to him report the station agents, yard masters, etc., of his division.

The comptroller is the chief bookkeeper of the railroad, and his department includes the auditor of receipts, auditors of disbursements, traveling auditors, clerk of statistics, and local treasurers and paymasters, who receive money from the treasurer and disburse it under the direction of the comptroller.

The treasurer makes all payments of dividends and interest under the direction of the president. The purchasing agent buys all material and supplies for the railroad on requisition from heads of departments, and

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under him are local storekeepers of each division.

The general counsel is at the head of the legal department, and in his department are the attorneys assigned to particular branches of the work.

Many roads have an industrial department organized for the purpose of locating manufacturing plants on the lines of the road. This department is in charge of the "industrial commission."

The land commissioner has charge of the lands of the railroad, secured under land grants from the federal government, states, counties, and cities.

The surgeon of a railroad sometimes is a physician or surgeon who lives on the line of the railroad, but every important railroad company has its own medical and surgical staff. Some railroads have a system of hospitals in which sick and injured employees are cared for. The company owns the hospital buildings, and the hospital service is maintained by assessments paid in by the employees of the road. Any deficit is made up by the company.

*Physical Development of Railroads.*—The pioneer railroads used flat strips of iron for rails. The iron was laid on heavy wooden beams or sills, which were laid on the transverse sleepers or ties. The American railroad builder early departed from the English system of building roadways. In England railroads were built to connect cities of population and industry. The Stephensons' success with the *Rocket*, and their recognized superiority in locomotive construction, made them leaders in railroad construction. Their locomotives had but little side play to the wheels, and this rigidity in construction made it impossible for them to go around sharp curves. This led to straight lines and easy grades, and the other English engineers took as their model the locomotives and railroads built by the Stephensons. What was feasible in England with its large population and important cities ready to provide revenues at once for railroads, was not possible in the U. S. The first railroads built in the U. S. naturally followed the lines laid down by English engineers, but scarcity of money prevented the Americans from building solid, straight lines with easy curves and gentle grade. Hence the American railroad engineer was compelled to leave English models behind, and strike out into the wilderness, blazing his own path.

The first locomotives in America were modeled after the English machines, and were not suited to the rough tracks and sharp curves of American railroads. Horatio Allen suggested the swiveling truck to the engineers of the West Point foundry for the locomotive they were building for the South Carolina Railway in 1831. But the suggestion was not adopted, and the swivelling truck was first put into practical use on the Mohawk & Hudson Railroad in the same year.

In 1838 Joseph Harrison, Jr., of Philadelphia, invented the equalizing beams or levers which



throw the weight of the engine on 3 out of 4 or more driving wheels at all times. The equalizing beams kept the engine level and this added to the flexibility of the locomotive, which for many years was unique to the equipment of the railroads in the U. S.

Two years before Harrison invented the equalizing beams, Henry R. Campbell of Philadelphia obtained a patent for "two pairs of driving wheels and a truck." The driving wheels were coupled by rods, and the truck was placed under the smokestack. This type of locomotive was adopted generally in the U. S., and with the swiveling trucks and equalizing bars constituted the American type of the locomotive.

See *Steam* for detailed history and description of locomotives.

The first passenger cars in England were made of the bodies of stage coaches, mounted on four car wheels. Each car consisted of one stage-coach body, with the seats extending from one side to the other. The first improvement came when two or three stage-coach bodies were joined together on one car. In time, a passenger car was built, in which the sides and roof were continuous, but the compartments remained, and the passenger cars of Europe and England to-day bear a close resemblance interior and exterior to stage-coach bodies. The enginemen and train men on the first railroads of England bore the names of the men in corresponding positions on stage lines. The locomotive engineer was called the "driver," the conductor the "guard," the ticket office the "booking office." Cars were called "carriages," and this nomenclature has been retained in England.

The early railroad men of the U. S. discarded the English stage-body passenger car, and adopted a long, box-shaped car, with an aisle extending down the middle, and a door at each end. A platform was built at each end of the car so that in a train of passenger cars, a conductor or passenger was able to walk through from one end to the other. The long car was carried on bodies or trucks swiveled so that the car could travel around sharp curves.

The first fully equipped passenger train hauled by a steam locomotive which ran in regular service in the U. S. was one on the Mohawk & Hudson Railroad, October, 1831. This was six years after the opening of the Stockton & Darlington Railroad in England. This road was opened Sept. 27, 1825, and the first train was a freight train, which also carried some passengers, guests of the officials of the road. In October of that year a passenger car, modeled after a stage coach, was put on, and carried six "inside" and fifteen "outside" passengers. The road was 12 mi. long, and the train made the distance in two hours. The fare from Stockton to Darlington was one shilling, and fourteen pounds of baggage per passenger was allowed the purchaser of a ticket. The experiment was a success, and the passenger service became a fixture.

In all probability passengers were carried on the Carbondale Railroad, but the first time

table published for passenger trains in the U. S. was issued by the Baltimore & Ohio Railroad in June, 1830. In this "railroad notice" the passenger train was called a "brigade of cars." Ross Williams, of Baltimore, patented a car mounted on two trucks, each with four wheels. The trucks were connected to the floor of the car by king bolts, so that the trucks could follow the rails around short curves. This was a decided improvement, and from that time the development of the American passenger car kept pace with the development of the American railroad. In 1849 the Hodges hand brake was patented, and two years later an improvement in the Stevens brake was introduced. The Westinghouse air brake was invented in 1868, but George Westinghouse Jr. had such difficulty in inducing railroads to adopt it that it was many years before the air brake was regarded as an important and essential feature on passenger cars. See *Air Brake* under *Compressed Air*.

The Miller coupler and buffer was patented in 1863, and this was followed by the Janney coupler and later by the several standard automatic car couplers which are used at the present time. The essential feature of the modern automatic car couplers is the two knuckles of the coupler, which are automatically locked and securely held when thrust together. Springs keep the buffers together when the train is in motion, and the effect of a solid train is thus secured without slack and yet flexible enough to round curves.

It is said that the first arrangements to provide a railroad passenger a place to sleep in a car were made on the Cumberland Valley Railroad of Pennsylvania as early as the winter of 1836-37. A car was fitted up with berths, three to a section, or 12 berths to the car. This crude sleeping car was used for 12 years. Before 1858, when George M. Pullman first began making experiments for a sleeping car, a few railroads had crude, uncomfortable sleepers in service. Mr. Pullman, in 1859, altered some day cars of the Chicago & Alton, into sleeping cars which proved so successful that in 1864 Mr. Pullman felt justified in building a "Pullman sleeper." It was built in the shops of the Chicago & Alton, cost \$18,000, and was named the *Pioneer*. Not long after the *Pioneer* was finished, in the spring of 1865, the body of President Lincoln was brought to Chicago, and the *Pioneer* was used as a funeral car. The next year the car was placed in regular service on the Chicago & Alton Railroad, and in 1867 Pullman's Palace Car Company was organized for the purpose of operating the Pullman system of sleeping cars which is intimately associated with railroads all over the U. S. Soon after, the Wagner car company was organized, and both companies practically divide the sleeping-car business of the country between them. A few railroads operate their own sleeping cars, but the business is regarded as a specialty and treated as such.

The first hotel car, a combination of a sleeping and dining car, was put into service on the

Great Western Railway of Canada in 1867. The first dining car was put into service on the Chicago & Alton Railroad in 1868. In 1887 the "vestibule car" was patented by George M. Pullman. When a number of vestibule cars are made up into a train, it is called a "vestibuled train," and the first of the kind was put into service on the Pennsylvania Railroad in 1887. A vestibuled limited train in the U. S. contains sleeping cars, a dining car, and a car fitted up with smoking room, library, bath room, barber shop, etc.

A standard passenger car is fitted up with two six-wheeled trucks, hot water or steam heating appliance, electric or gas lights, automatic couplers, automatic air brakes, is from 50 to 52 ft. long, weighs from 45,000 to 60,000 lbs. and is valued at from \$4,500 to \$5,500. A drawing-room car is from 50 to 65 ft. long, weighs from 70,000 to 80,000 lbs., and is valued at from \$10,000 to \$20,000. A sleeping car is from 50 to 70 ft. long, weighs from 60,000 to 90,000 lbs., and costs from \$12,000 to \$25,000.

The earlier freight cars were short, open box cars. The goods were protected from the weather by canvas covers, and their carrying capacity was limited to a few tons. The ordinary flat car used at the present time is 34 ft. long, and has a capacity of 40,000 lbs. Box cars average 34 ft. in length and refrigerator cars from 30 to 34 ft. in length. The carrying capacity of freight cars has steadily increased, and they now are loaded to 20 and 30 tons. The pressed steel cars used on the Pittsburgh, Bessemer & Lake Erie railroad for carrying iron ore from Conneaut Harbor, O. to Pittsburgh, Pa., have a maximum capacity of 100,000 lbs. They were put into service in the summer of 1897. Freight cars are equipped with automatic couplers and automatic air brakes, and reports from railroads now show that nearly a million freight cars have been equipped with air brakes.

**Railway Signaling.**—In order to protect passenger and freight trains and prevent collisions, railroad lines are divided into blocks, the length of a block varying according to the requirements of traffic. On the line, away from terminals, the blocks are long; near terminals they are shorter. Block signaling may be divided into two classes; absolute block and permissive block. Absolute blocking does not allow two trains to be in any part of the same block on the same track at the same time. In permissive blocking, the trains are spaced by time. When one train has passed into a block, another train is not permitted to enter the same block until a certain time has elapsed; generally the time limit is ten minutes for passenger, and five for freight trains. On some roads the absolute block is used to protect passenger trains, and the permissive block is used to protect freight trains.

Movements of trains from one block to another are guided by block signals, which are operated under three systems; telegraph, controlled manual, and automatic. In the telegraph system, a tower is placed at the beginning of each block, and in the tower house is the op-

erator. The towers are connected by telegraph. When a train passes out of one block, and into the next one, the telegraph operator at that point notifies the operator in the tower in the rear that his block is clear. The operator then throws his signal to "clear," and thus shows the locomotive engineer of the next train that he has permission to proceed. It also is the practice on some roads for the operator to notify the operator of the tower in advance that a train has entered the block. In this system it is necessary for the operators to be vigilant and accurate, for the success of the system depends entirely upon their faithfulness.

The controlled manual system is an improvement on the telegraph block. It is a telegraph block in itself, but an interlocking system, operated by electricity, prevents the operator in the rear from throwing his signal to clear until the operator in advance has signaled the passage of the train from out of the block.

In the automatic system, the train itself sets or releases the signals by means of electricity. Each block is electrified, through its rails, and at the same time is insulated from connecting blocks. But each block also is electrically connected by line wire with the block on each side, and in some instances with the second blocks on each side. For instance, suppose three blocks, each a mile long, A, B, and C. A train enters block A. At once the semaphore at the beginning of the block comes to the position designating "stop." This sometimes is called the danger signal. Above this semaphore is another one, and it also raises to the horizontal position, so that both semaphore blades are at the danger position. The train proceeds, and leaves block A, for block B. As it does this, it sets both semaphores there at danger, and releases the upper semaphore of block A, so that it drops. This shows that block A is clear, but that the train is in block B. The train proceeding leaves block B for block C. At once the two semaphores at block C come to danger; the lower semaphore of block A drops so that both semaphore blades there are "clear;" and the upper semaphore at block B drops to clear. This shows that block A is clear with the train not nearer than block C, and that block B is clear with the train in block C, and that block C is "blocked" because the train is still in it. In this system no train can follow another closer than two blocks.

There are three forms of signals used in the automatic blocking; the semaphore, revolving banner, and disk. The disk sometimes is called the "banjo" signal, because of its shape. The box has an opening in the front and rear, covered with ordinary uncolored glass. In this box a light is placed. A moveable disk made of red silk, stretched over a light frame, is made to drop in front of the opening to give the danger signal; the red banner in the day time and the red light at night. An electro-magnet raises the disk, and when the circuit is broken by train, the disk drops. The banner signal is operated by clock work, but is controlled by electricity.

## Railroads

The semaphore arm is regarded as the standard signal. The best form of this system is the electro-pneumatic, in which compressed air is used to operate the semaphore blades, and the electric current is used to open and close the valves. The semaphore blade is a board, pivoted to a post, with a heavy iron casting back of the pivot so that unless power is used to pull the blade down, the arm is always at the stop position. The casting also carries a colored glass lens, either red or green. On the post is hung a lantern. When the blade is at the danger position, the red lens is in front of the light, giving a red light at night. On the roads where green is the danger color, the light will be that color. When the blade is dropped to the clear position, the light shows white.

All signals are classed under two heads: home and distant. When the home signal is at its danger position it means stop; when the distant signal is at its danger position it means caution. The home signal semaphore has the end of its arm square; the distant signal is a semaphore arm with a notch cut in the end; this is called a fish-tail semaphore. The home signal at night shows a red light for danger and a white light for safety; the distant signal for night shows a green light for caution, and a white light for safety, except on those roads where red indicates danger, green clear, and a combination of red and green caution.

Home signals are of two kinds: high and low; the latter also is called dwarf. High home signals control tracks in their right or usual running direction; low or dwarf signals are used for side tracks to signal a train going from a main to a side track or from one side track to another. The signal is placed at the right hand side of the track it governs unless other tracks are so close that it would be unsafe to locate them so.

When signals and switches are so arranged that their movements are made dependent on each other, the system is called "interlocking." In the interlocking switch and signal system, all the switches in the group are operated from a tower by the operator of the interlocking machine. The principle of interlocking is that no signal can be shown to indicate that the track is clear until the switches are properly set. That is, the switching is done first, and until that is done and properly done, the operator cannot show the clear signal. All signals in an interlocking system are normally set at danger. The interlocking machine is a system of levers which are connected by means of pipe rods and bell cranks with the switches. The operator in throwing switches to clear a certain route for a train interlocks the levers controlling opposing switches in such a manner that such switches cannot be moved. This is done in the machine itself, and prevents the operator from laying out conflicting routes. Switches and signals often are worked at such a distance from the tower that the operator cannot see the signals. In such cases electrical annunciators tell the operator if the contemplated movements of switches have been made.

MALCOLM McDOWELL.

## Rain

**Rain**, the water that falls from the heavens. Rain depends upon the formation and dissolution of clouds. The invisible aqueous vapor suspended in the atmosphere, which forms clouds, and is deposited in rain, is derived from the evaporation of water, partly from land, but chiefly from the vast expanse of the ocean. At a given temperature the atmosphere is capable of containing no more than a certain quantity of aqueous vapor, and when this quantity is present the air is said to be saturated. Air may at any time be brought to a state of saturation by a reduction of its temperature, and if cooled below a certain point the whole of the vapor can no longer be held in suspension, but a part of it condensed from the gaseous to the liquid state will be deposited in dew or float about in the form of clouds. If the temperature continues to decrease, the vesicles of vapor composing the cloud will increase in number and begin to descend by their own weight. The largest of these falling fastest will unite with the smaller ones they encounter during their descent, and thus drops of rain will be formed of a size that depends on the thickness, density, and elevation of the cloud. The point to which the temperature of the air must be reduced in order to cause a portion of its vapor to form clouds or dew is called the dew point. The use of the spectroscope has become to some extent a means of anticipating a fall of rain, since when light that has passed through aqueous vapor is decomposed by the spectroscope a dark band is seen, which is the more intense the greater the amount of vapor present. The average rainfall in a year at any given place depends on a great variety of circumstances, as latitude, proximity to the sea, elevation of the region, configuration of the country and mountain ranges, exposure to the prevailing winds, etc. When the vapor-laden atmosphere is drifted toward mountain ranges it is forced upward by the latter, and is consequently condensed, partly by coming into contact with the cold mountain tops, and partly by the consequent expansion of the air due to the greater elevation. The presence or absence of vegetation has also considerable influence on the rainfall of a district. Land devoid of vegetation has its soil intensely heated by the fierce rays of the sun, the air in contact with it also becomes heated, and is able to hold more and more moisture, so that the fall of rain is next to impossible. On the other hand, land covered with an abundant vegetation has its soil kept cool, and thus assists in condensation. Although more rain falls within the tropics in a year, yet the number of rainy days is less than in temperate climes. Thus in an average year there are 80 rainy days in the tropics, while in the temperate zones the number of days on which rain falls is about 160. At the equator the average yearly rainfall is estimated at 95 in. At a few isolated stations the fall is often very great. At Cherrapunjee, in the Khasia Hills of Assam, 615 in. fall in the year, and there are several places in India with a fall of from 190 to 280 in. The rainfall at



## Rainbow

New York is 43 in.; Washington, 41 in.; San Francisco, 22 in.; Sitka, Alaska, 90 in.

**Rainbow**, a bow, or an arc of a circle, consisting of all the prismatic colors, formed by the refraction and reflection of rays of light from drops of rain or vapor, appearing in the part of the heavens opposite to the sun. When the sun is at the horizon the rainbow is a semi-circle. When perfect the rainbow presents the appearance of two concentric arches; the inner being called the *primary*, and the outer the *secondary* rainbow. Each is formed of the colors of the solar spectrum, but the colors are arranged in the reversed order, the red forming the exterior ring of the primary bow, and the interior of the secondary. The primary bow is formed by the sun's rays entering the upper part of the falling drops of rain, and undergoing two refractions and one reflection; and the secondary, by the sun's rays entering the under part of the drops, and undergoing two refractions and two reflections. Hence, the colors of the secondary bow are fainter than those of the primary. Rainbows are sometimes produced by the sun's rays shining on the spray of cascades, fountains, etc., and then a whole circle can frequently be seen. A broken rainbow mostly occurs from the field not being filled with falling rain, but it will also happen when the sun is invisible from part of the field. The moon sometimes forms a bow or arch of light, more faint than that formed by the sun, and called a *lunar rainbow*. A *spurious* or *supernumerary rainbow* is a bow seen in connection with a fine rainbow, lying close inside the violet of the primary bow, or outside that of the secondary one. Its colors are fainter and more impure, as they proceed from the principal bow, and finally merge into the diffused white light of the primary bow, and outside the secondary.

**Rain Gauge** (or Pluviometer) an instrument used to measure the quantity of rain which falls at a given place. They are variously constructed. A convenient form consists of a cylindrical tube of copper, with a funnel at the top where the rain enters. Connected with the cylinder at the lower part is a glass tube with an attached scale. The water which enters the funnel stands at the same height in the cylinder and glass tube, and being visible in the latter the height is read immediately on the scale, and the cylinder and tube being constructed so that the sum of the areas of their sections is a given part, for instance a tenth of the area, of the funnel at its orifice, each inch of water in the tube is equivalent to the tenth of an inch of water entering the mouth of the funnel. A stopcock is added for drawing off the water. A simpler form of gauge consists of a funnel having at the mouth a diameter of 4.697 inches, or an area of 17.33 sq. in. Now as a fluid ounce contains 1.733 cubic in., it follows that for every fluid ounce collected by this gauge the tenth of an inch of rain has fallen. Recently-constructed automatic gauges give a continuous record of rainfall; indicate the duration of each shower, the amount of rain fallen, and rate at which it fell.

## Rájputana

**Rainy Lake** (or René Lake), a body of water forming part of the boundary between Minnesota and Canada. It is about 50 mi. long, and of irregular breadth; receives the waters of numerous small lakes from the east and north-east, and empties itself by Rainy River, about 90 mi. long, into the Lake of the Woods.

**Raisins**, the dried fruit of various species of vines, comparatively rich in sugar. They are dried by natural or artificial heat. The natural and best method of drying is by cutting the stalks bearing the finest grapes half through when ripe, and allowing them to shrink and dry on the vine by the heat of the sun. Another method consists of plucking the grapes from the stalks, drying them, and dipping them in a boiling lye of wood-ashes and quicklime, after which they are exposed to the sun upon hurdles of basket-work. Those dried by the first method are called raisins of the sun or sun-raisins, muscatels, or *blooms*; those by the second, *lexias*. The inferior sorts of grapes are dried in ovens. Raisins are produced in large quantities in the south of Europe, Egypt, Asia Minor, California, etc. A kind without seeds, from Turkey, are called *sultanas*. The Corinthian raisin, or currant, is obtained from a small variety of grape peculiar to the Greek islands.

**Rajah** (or Rájá), in India, originally a title which belonged to those princes of Hindu race who, either as independent rulers or as feudatories, governed a territory; subsequently, a title given by the native governments, and in later times by the British government to Hindus of rank. It is now not unfrequently assumed by the zemindars or landholders, the title *mahárájah* (great rajah) being in our days generally reserved to the more or less powerful native princes.

**Rájputa'na**, a large province of India, under the suzerainty of Britain since 1817, in the west part of Hindustan proper, extending from the Jumna and Chumbul rivers, west to Sind and Bhawalpur, and comprising the greater part of the Indian Desert. It includes the British district of Ajmere-Merwara and twenty autonomous states, each under a separate chief; has a total area of 132,461 sq. mi., and a pop. of 10,562,771, exclusive of a considerable Bheel population, estimated at 166,000. Rájputana is intersected by the Aravali Mountains, to the north of which the country is desert, and part of it wholly destitute of inhabitants, water, and vegetation. The soil is remarkably saline, containing many salt springs and salt lakes, and much of the well water is brackish. To the south of the range the country is more fertile, being watered by the drainage of the Vindhya Mountains. The dominant race, though not the most numerous, is the Rájput, numbering about 700,000. They are the aristocracy of the country; and to a large extent they hold the land either as receivers of rent or as cultivators. They are essentially a military people, and many of their institutions bear a strong resemblance to the feudal customs which prevailed in Europe in the Middle Ages. They have likewise been celebrated

## Rājshāhi

for their chivalrous spirit, so unlike the effeminacy and duplicity of many of the Oriental nations. The province, which is traversed by two railway lines, is administered by a governor general's agent.

**Rājshāhi**, a division or commissionership of Bengal, extending from the Ganges to Sikkim and Bhutan. Area 17,428 sq. mi.; pop. 7,733,775. The district of Rājshāhi, forming part of the division, has an area of 2,361 sq. mi.; a pop. of 1,338,638. Capital of div. and dist. Rampur Beaulah.

**Rake**, an implement which in its simplest form consists merely of a wooden or iron bar furnished with wooden or iron teeth, and firmly fixed at right angles to a long handle. In farming it is used for collecting hay, straw, or the like, after mowing or reaping; and in gardening it is used for smoothing the soil, covering the seed, etc. Large rakes for farm work are adapted for being drawn by horses; and there are many modifications both of the hand rake and the horse rake.

**Raleigh**, Wake co., N. C., near Neuse River. Railroads: Ral. & Gast.; Ral. & Aug. Air Line; Rich. & Danv. Industries: three cotton factories, flouring mill, iron foundry, cotton-seed oil mill, paper mill, furniture, ice, wagon, and other factories. Surrounding country agricultural. The town was first settled in 1792 and was made state capital by act of the General Assembly in that year. Population, 1900, 13,643.

**Raleigh** (ral'i) (or Raleigh), SIR WALTER, (1552-1618), navigator, warrior, statesman, and writer in the reigns of Elizabeth and James I, was the second son of a gentleman of ancient family in Devonshire. He studied at Oxford, and at the age of seventeen he joined a body of gentlemen volunteers raised to assist the French Protestants. Little is known of his adventures for some years, but in 1580-81 he distinguished himself in the Irish rebellion. He now became a favorite at court, a result which has been traditionally attributed to an act of gallantry, namely, his throwing his embroidered cloak in a puddle in order that the queen might pass. In 1584 he obtained a charter of colonization and unsuccessfully attempted the settlement of Virginia in one or two following years. In 1584, also, he obtained a large share of the forfeited Irish estates, and introduced here the cultivation of the potato. Through the queen's favor he obtained licenses to sell wine and to export woolens, was knighted and made lord-warden of the Stanaries or tin mines (1585), vice admiral of Devon and Cornwall, and captain of the queen's guard (1587). In 1588 he rendered excellent service against the Spanish Armada, and subsequently vessels were fitted out by him to attack the Spaniards. To discover the fabled El Dorado or region of gold he planned an expedition to Guiana, in which he embarked in 1595, and reached the Orinoco; but was obliged to return after having done little more than take a formal possession of the country in the name of Elizabeth. In 1596 he held a naval command against Spain under Lord Howard

## Rameses

and the Earl of Essex, and assisted in the defeat of the Spanish fleet and the capture of Cadiz. Next year he captured Fayal in the Azores; in 1600 he became governor of Jersey. James I, on his accession in 1603, had his mind soon poisoned against Raleigh, whom he deprived of all his offices. Accused of complicity in Lord Cobham's treason in favor of Arabella Stuart, Raleigh was brought to trial at Winchester in November, 1603, found guilty of treason, and sentenced to death. He was, however, reprieved and confined to the Tower. Here he remained for twelve years, devoting himself to scientific and literary work. In 1616 he obtained his release by bribing the favorite Villiers, and by offering to open a mine of gold which he believed to exist near the Orinoco. The enterprise proved disastrous. Raleigh's force had attacked the Spaniards, and on his return James, to favor the Spanish court, with his usual meanness and pusillanimity determined to execute him on his former sentence. After a trial before a commission of the privy council the doom of death was pronounced against him, and was carried into execution. As a politician and public character Raleigh is doubtless open to much animadversion; but in extent of capacity and vigor of mind he had few equals, even in an age of great men.

**Ram**, a steam ironclad ship-of-war, armed at the prow below the water line with a heavy iron or steel beak intended to destroy an enemy's ships by the force with which it is driven against them. The beak is an independent adjunct of the ship, so that, in the event of a serious collision, it may be either buried in the opposing vessel or carried away, leaving uninjured the vessel to which it is attached. By naval experts the ram is considered as a main element in the solution of the problem of coast defense.

**Rama** (rā'ma), in Hindu mythology, the name common to the personage appearing as three incarnations of Vishnu, all of surpassing beauty.

**Ramadan'** (Rhamazan', or Ramadan'), the ninth month in the Mohammedan year, during which it is said Mohammed received his first revelation. It is devoted to fasting and abstinence. From sunrise to sunset for the thirty days of its duration the Mohammedans partake of no kind of nourishment. After sunset necessary wants may be satisfied, and this permission is liberally taken advantage of. Believers are exempted in peculiar circumstances from observing the fast. As the Mohammedans reckon by lunar time, the month begins each year eleven days earlier than in the preceding year, so that in thirty-three years it occurs successively in all the seasons.

**Ram'es** (or Ramses) (in Egyptian, "the Child of the Sun"), the name given to a number of Egyptian kings. RAMESES I was the first king of the nineteenth dynasty, and was not among the most remarkable of the series. RAMESES II, grandson of the preceding, was the third king of the nineteenth dynasty, and was born in the quarter of a century preceding

## Rameses

the year 1400 B.C. He is identified by many with the Sesostris of Greek writers. See *Sesostris*. His first achievement was the reduction of Ethiopia to subjection. He defeated a confederation among whom the Khita or Hittites were the chief in a great battle near the Orontes in Syria, and in a subsequent stage of the war took Jerusalem and other places. He was a zealous builder and a patron of art and science. He is supposed to have been the king who oppressed the Hebrews, and the father of the king under whom the exodus took place. RAMESES III, the Rhampsinitus of Herodotus, belonged to the twentieth dynasty, and was uniformly successful in war. He endeavored to surpass his ancestors in the magnificence of his buildings.

**Ram'eses**, one of the treasure cities of Egypt, built by the Hebrews during the oppression, and probably named after Rameses II. It has been identified by Lepsius with Tell-el-Maskhûta on the Fresh-water Canal.

**Rames'waram**, a low, sandy island in the Gulf of Manaar, between the mainland of India and Ceylon. It is about 11 mi. long and 6 broad, and contains one of the most venerated Hindu temples in India, the resort of thousands of pilgrims. Pop. 17,854.

**Rampant**, in heraldry, standing upright upon its hind legs (properly on one foot) as if attacking; said of a beast of prey, as the lion. It differs from *salient*, which means in the posture of springing forward. *Rampant guardant* is the same as *rampant*, but with the animal looking full-faced. *Rampant regardant* is when the animal in a rampant position looks behind. See *Heraldry*.

**Rampart**, in fortification, an elevation or mound of earth round a place, capable of resisting cannon shot, and on which the parapet is raised. The rampart is built of the earth taken out of the ditch, though the lower part of the outer slope is usually constructed of masonry. The term in general usage includes the parapet itself.

**Rámpur**, capital of a native state of the same name, Northwestern Provinces of India, on the left bank of the Kosila River, 18 mi. e. of Moradabad. It is the residence of the nawab, and has manufactures of pottery, damask, sword blades, and jewelry. Pop. 74,250. The state, which is under the political superintendence of the government of the Northwestern Provinces, has an area of 945 sq. mi. and a pop. of 551,249.

**Ramsey**, DAVID (1749-1815), patriot and historian, b. in Pennsylvania. He served as surgeon during the Revolutionary War, was a delegate to the Continental Congress in 1782-86, and president of the South Carolina senate for seven years. He was shot by a lunatic. Chief works: *History of the Revolution in South Carolina*, *History of the American Revolution*, *History of the U.S.*, etc.

**Ramsgate**, a seaport and watering place of England, county of Kent, in the Isle of Thanet, 67 mi. e. by s. of London. The harbor, which serves as a harbor of refuge for the Downs, is nearly circular, comprises an area of about 50

## Ranke

acres. Shipbuilding and rope making are carried on; there is some trade in coal and timber, and a considerable fishery. Ramsgate was formerly a member of the Cinque Ports, and attached to Sandwich; it is now a separate municipal borough. Pop. 24,676.

**Randall** SAMUEL J. (1828-1890), statesman, b. in Philadelphia, Pa. In 1862 he was elected to Congress, serving continuously until his death. He was speaker of the House from 1876 to 1881. As such he used his influence in guiding the House through the dangerous crisis produced by the uncertainty of the presidential election of 1876.

**Randolph**, JOHN (1773-1833), "of Roanoke," was b. at Cawsons, in Virginia. He was a second cousin of Edmond Randolph, and boasted the Indian princess Pocahontas among his ancestors. In 1799 he was elected to Congress, where he became distinguished for his eloquence, wit, sarcasm, invective, and eccentricity, and for thirty years was more talked and written about than any American politician. Tall and meager, peculiar in dress and manners, he was described as a strange mixture of the aristocrat and the Jacobin. He was the Democratic leader of the House of Representatives, but quarreled with Jefferson, and opposed the War of 1812; he opposed also the Missouri Compromise, and stigmatized its Northern supporters as "Doughfaces;" and he sided against Jackson on the nullification question. From 1825 to 1827 he sat in the Senate, and in 1830 he was appointed minister to Russia. By his will he manumitted his numerous slaves, and provided for their settlement in a free colony. He d. in Philadelphia.

**Rangoon**, the capital of Lower Burmah, and the chief seaport of Burmah, is situated at the junction of the Pegu, Hlaing or Rangoon, and Pu-zun-doung rivers, about 21 mi. from the sea. Since its occupancy by the British in 1852 Rangoon has undergone such changes that it is practically a new town, and its population has increased fivefold. The principal streets are broad, and contain many large and not a few handsome buildings. There are the law courts, post offices, Bank of Bengal, custom-house, Anglican and Roman Catholic churches, St. John's College, high school, etc. A large and increasing commerce is carried on with British, Indian, and Chinese ports; and an extensive trade is conducted with inland towns as far as Mandalay. The chief exports are rice, timber, cotton, hides, gums, and resins, mineral oil, ivory, precious stones; the imports being mainly manufactured goods. A number of rice mills have been erected; there is a government dockyard, and steam tram cars have been introduced. Pop. 181,210. The district of Rangoon produces rice, cotton, catechu, gambier, etc.; has an area of 4,236 sq. mi., and pop. of 427,720.

**Ranke** (rán'kè), LEOPOLD VON (1795-1886). German historian. He studied at Halle and Berlin, became a teacher in the gymnasium of Frankfurt-on-the-Oder in 1818, and professor of history at the University of Berlin in 1825. His first published work was a *History of the*



## Ransom

*Romance and Teutonic Nations from 1494 to 1535.* This was followed by *Princes and Peoples of Southern Europe in the Sixteenth and Seventeenth Centuries*, *The Serbian Revolution*, *History of the Popes*, *History of Germany in the time of the Reformation*, *History of Prussia during Seventeenth and Eighteenth Centuries*, *History of France*, chiefly in the Sixteenth and Seventeenth Centuries, *History of England in the Seventeenth Century*, besides a number of smaller works. At the age of eighty he undertook with undiminished vigor to write a *World History*, and a volume of this great work appeared every year until his death.

**Ransom**, the money or price paid for the redemption of a prisoner, captive, or slave, or for goods captured by an enemy, and formerly a sum paid for prisoners of war.

**Ranunculus**, a genus of herbaceous plants, the type of the nat. order Ranunculaceæ. They have entire, lobed, or compound leaves, and usually panicled, white or yellow flowers. The species are numerous, and almost exclusively inhabit the northern hemisphere. Almost all the species are acrid and caustic, and poisonous when taken internally, and, when externally applied, will raise blisters. The various species found in the U. S. are known chiefly by the common names of crowfoot, buttercup, and spearwort. *R. flammula* and *scelerotus* produce a blister on the skin in about an hour and a half. Beggars use them for the purpose of forming artificial ulcers to excite the compassion of the public. *R. Ficaria* is the lesser celandine. *R. aquatilis* is the water crowfoot, a nutritive food for cattle.

**Rape**, the carnal knowledge of a woman forcibly and against her will. In the U. S. this crime is treated as a felony, and the punishment is imprisonment for life, or a term of years.

**Raphael** (or Raffaello), SANZIO (or Santi) (1483-1520), one of the greatest painters that ever lived, was b. at Urbino. His father, Giovanni Sanzio, a painter of some merit, from whom young Raphael received his first instruction, d. in 1494, and he was then intrusted to the care of an uncle. His studies, however, were not interrupted, and at the early age of twelve he was received into the studio of Perugino at Perugia as one of his pupils, and continued with that celebrated painter for six or eight years. The pupil was soon permitted to share in the master's work, and when he came to paint independently he was seen to have acquired Perugino's manner. About this time the painting of the library of the cathedral at Siena was intrusted to Pinturicchio, a fellow pupil, and Raphael is said to have assisted in the work. In 1504 he visited his native town, and while there painted *Christ Praying on the Mount of Olives*, a *St. Michael*, and a *St. George*, the two last of which are now in the Louvre. Toward the end of the same year he proceeded to Florence, attracted thither by the fame of its numerous artists, and in this center of the highest artistic life of the time he studied diligently over a period of four years, with short intervals of return to his native city. In

## Rapier

Florence he rapidly gained a wider knowledge of his art, and soon began to forsake the manner which he had adopted from Perugino. The sources from which he sought and obtained the artistic knowledge which enabled him to develop his new style were various. From Michael Angelo he learned simplicity and strength of outline, from Leonardo da Vinci he acquired grace of expression and composition, while from Fra Bartolommeo he gained a subtler depth of coloring, and from Masaccio a broader treatment of drapery and dramatic effects. During the last two years of his stay in this city he painted, in what is known as his Florentine manner, many of what are now considered his most important works. Of such may be mentioned the *Madonna del Gran Duca*; *Madonna del Giardino*; *Holy Family*; *Christ Bearing the Cross*; *Mariage of Joseph and the Virgin*; *The Ansidei Madonna*; *Madonna*; *Tempi Madonna*; and the *Bridgewater Madonna*. About this time Pope Julius II had employed Bramante in rebuilding St. Peter's and in embellishing the Vatican, in which work Raphael was invited to assist. Here he executed the *Disputa* or Dispute of the Fathers of the Church, on the wall of the second chamber, called the *stanza della Segnatura*, next to the great hall of Constantine. In this painting we recognize the transition to his third manner, which is still more clearly manifested in the *School of Athens*, the second painting in this chamber. Besides these he painted as Vatican frescoes (1508-11) the allegorical figures of *Theology*, *Philosophy*, *Justice*, and *Poetry*, in the corners of the ceiling; the *Fall of Adam*, *Astronomy*, *Apollo* and *Marsyas*, and *Solomon's Judgment*, all having reference to the four principal figures of the apartment; and, lastly, on the fourth wall, over the windows, *Prudence*, *Temperance*, and *Fortitude*; below them the *Emperor Justinian Delivering the Roman Law to Tribonian*, and *Gregory X Giving the Decretals to an Advocate*, and under them *Moses* and an armed allegorical figure. After the accession of the new pope, Leo X, Raphael painted his *Leo the Great Stopping the Progress of Attila*, the *Deliverance of Peter from Prison*, and, on the ceiling, *Moses Viewing the Burning Bush*, the *Building of the Ark*, *The Sacrifice of Isaac*, and *Jacob's Dream*. With the *Conflagration of the Borgo Extinguished by the Prayers of Leo*, Raphael began the third stanza of the Vatican. During this time Raphael prepared designs for several palaces in Rome and other cities of Italy, finished the *Madonna* for the church of St. Sixtus in Piacenza, and painted the portraits of *Beatrice of Ferrara*, of the *Fornarina*, of *Carondelet*, and of *Count Castiglione*. To this period also belong his easel-pieces of *John in the Desert*, his *Madonna and Child*, on whom an angel is strewing flowers, the *Madonna della Seggiola*, *St. Cecilia*. Raphael's last and unfinished painting, the *Transfiguration of Christ*, is in the Vatican. Pl. 30, Vol. IV.

**Rapier**, a light, highly tempered, edgeless, and finely pointed weapon of the sword kind used for thrusting. It is about three feet in

## Rappahannock

length, and was long a favorite weapon for duels. Its use now, however, is restricted to occasions of state ceremonial.

**Rappahan'nock**, a river in Virginia, which rises in the Blue Ridge, runs e.s.e. about 130 mi. and flows into Chesapeake Bay. It passes the towns of Falmouth, Fredericksburg, Port Royal, and Leeds, and is navigable to Fredericksburg, 110 mi.

**Rapto'res**, the birds of prey, an order of birds also called *Accipitres*, including those which live on other birds and animals, and are characterized by a strong, curved, sharp-edged, and sharp-pointed beak, and robust, short legs, with three toes before and one behind, armed with long, strong, and crooked talons. The eagles, vultures, falcons, and owls are examples.

**Raraton'ga** (or Rarotonga), an island in the South Pacific Ocean, belonging to the group of the Hervey Islands. It is about 30 mi. in circuit, and consisting of a mass of mountains, becomes visible at a great distance, and has a very romantic appearance. The inhabitants, about 4,000, have been converted to Christianity.

**Rar'itan**, a river of New Jersey, formed by two branches which unitedly flow southeast, and fall into Raritan Bay near Perth Amboy. It is navigable as far as New Brunswick.

**Rask**, RASMUS CHRISTIAN (1787-1832), Danish philologist. After he had studied at the University of Copenhagen he journeyed through Sweden, Russia, and Iceland to increase his knowledge of Northern languages, with the result that he published *An Introduction to the Knowledge of the Icelandic or Old Norse Tongue*; an edition of Haldorsen's Icelandic Dictionary, and an Anglo-Saxon grammar. In 1817-22 he made, at the expense of the government, a second journey to Russia, Persia, and India. He then returned to Copenhagen in 1822, was appointed professor of literary history and subsequently professor of Oriental languages and librarian to the university.

**Raso'res**, gallinaceous birds or scratchers, an order of birds comprising the sub-orders Gallinacei, or fowls, turkeys, partridges, grouse, etc., and the Columbacei, or pigeons, which are often made a distinct order. The common domestic fowl may be regarded as the type of the order. They are characterized by the toes terminating in strong claws, for scratching up seeds, etc., and by the upper mandible being vaulted, with the nostrils pierced in a membranous space at its base, and covered by a cartilaginous scale. The rasorial birds are, as a rule, polygamous in habits; the pigeons, however, present an exception to this rule, and their young are also produced featherless and helpless.

**Raspberry**, the fruit of a well-known shrubby plant which is of the same genus as the bramble or blackberry, dewberry, and cloudberry. Species are found in America, Europe, and Asia. Several varieties are cultivated, either red, flesh-colored, or yellow.

## Ratel

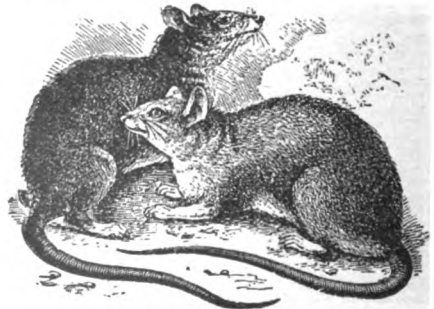


Raspberry.

**Raspberries** are much used in cookery and confectionery, and the juice, mixed with a certain portion of sugar and brandy, constitutes the liquor called *raspberry brandy*. *Raspberry Vinegar*, a refreshing summer beverage and cooling drink for in-

valids, is composed of raspberry juice, vinegar, and sugar.

**Rat**, one of the rodent mammalia, forming a typical example of the family Muridæ or mice. The best known species are the Norway or brown rat, and the black rat. The brown rat grows to about 9 in. in length, has a shorter tail than the other, small ears, is of a brownish color above and white below, and is altogether a much larger and stronger animal. Supposed to have belonged originally to India and China, it only became known in Europe about the middle of the eighteenth century; but it is now found in almost every part of the habitable globe, and where it has found a footing the black rat has disappeared. It is a voracious, omnivorous animal, swims readily



Black Rat; Brown Rat.

in water, breeds four or five times in the year, each brood numbering about a dozen, and these again breed in about six months. The black rat is usually about 7 in. in length, has a sharper head than the other, larger ears, and a much longer tail. It is much less numerous than the brown rat and more timid. To this *Mus rattus* variety belongs the white rat, which is sometimes kept as a household pet. Various other animals are called rats.

**Ratel'** (or honey badger), a carnivorous quadruped of the badger family, found chiefly in South and East Africa, and in India. The Cape or South African ratel averages about 3 ft. in length, including the tail, which meas-

## Ratification

ures 8 or 9 in. in length. The fur is thick and coarse, the color is black on the under parts, muzzle, and limbs, while the tail, upper surface, sides, and neck are of grayish hue. It



The Cape Ratel.

is celebrated for the destruction it makes among the nests of the wild bee, to the honey of which it is very partial.

**Ratification**, in law, the confirmation or approval given by a person arrived at majority to acts done by him during minority, and which has the effect of establishing the validity of the act which otherwise would have been voidable.

**Ratio**, the numerical measure which one quantity bears to another of the same kind, expressed by the number found by dividing the one by the other. The ratio of one quantity to another is by some mathematicians regarded as the quotient obtained by dividing the second quantity by the first; by others, as the quotient obtained by dividing the first by the second. Ratio is of various kinds: *Compound ratio*. When the one quantity is connected with two others in such a manner that if the first be increased or diminished the product of the other two is increased or diminished in the same proportion, then the first quantity is said to be in the *compound ratio* of the other two. *Direct ratio*. When two quantities or magnitudes have a certain ratio to each other, and are at the same time subject to increase or diminution, if while one increases the other increases in the same ratio, or if while one diminishes the other diminishes in the same ratio, the proportions or comparisons of ratios remain unaltered, and those quantities or magnitudes are said to be in a *direct ratio* or proportion to each other. *Inverse ratio*. When two quantities or magnitudes are such that when one increases the other necessarily diminishes, and vice versa when the one diminishes the other increases, the ratio or proportion is said to be *inverse*.

**Rationalism** is the doctrine which affirms the prerogative and right of reason to decide on all matters of faith and morals whatever so-called "authority" may have to say on the matter. Rationalism has had perhaps its chief center and widest success in Germany; but its chief source may be fitly found in the

## Ratisbon

English deism of the seventeenth and eighteenth centuries. The first step taken by the English deists was to attempt to eliminate from the doctrines of Christianity whatever is above the comprehension of the human reason; their next step was to discard from Christianity whatever in the way of fact was such as could not be verified by any man's experience, and this led to an attempt to get rid of Christianity altogether. German rationalism was also influenced by the writings of Voltaire, and the sceptical freedom of thought which obtained among the French *savants* at the court (1740-86) of Frederick the Great. It may be said to have begun with the translation into German of Tindal's *Christianity as Old as the Creation* (1741), the application of a rationalistic method by Professor Wolff of Halle University to the philosophy of Leibnitz (1736-50), and the advent of Frederick the Great. The initial movements of rationalism were followed up by such scholars and theologians as Eberhard, Eichhorn, Paulus, Teller, and Steinbart. With the beginning of the century, however, a new development occurred when Schleiermacher published in 1799 his *Discourses on Religion*. In his teaching he sought to establish a distinction between the dry rationalism of the understanding and the spiritual rationalism of what he called religious consciousness. Instead of accepting the Old and New Testaments as the supreme standard of religious truth Schleiermacher recognized them as only the recorded consciousness of the early church. Instead of finding in revelation a divine mode of conveying doctrine, he found it to be that illumination which the human mind receives from historical personages who have a genius for religion. In this form of reconstructive rationalism he was followed by De Wette, Fries, and Jacobi, and this second period continued until 1835. In this year Strauss published his *Leben Jesu* (Life of Jesus), a work in which, from the Hegelian standpoint, and in a destructive spirit, he discusses the origin of the New Testament. The movement which this originated has taken a tendency which is chiefly associated with scientific materialism, agnosticism, etc., and rationalism as a distinctive phase of religious controversy may be said to have then ceased.

**Ra'tisbon**, a town of Bavaria, capital of the province of Oberpfalz or Upper Palatinate, stands on the right bank of the Danube, opposite the junction of the Regen, 65 mi. n.n.e. of Munich and 53 mi. s.e. of Nuremberg; 1,010 ft. above the sea. There are several spacious and handsome streets and squares, and numerous fountains. The most remarkable public buildings are the cathedral; the Rathhaus; the Romanesque church of St. Emmeran; the palace of the princes of Thurn and Taxis; the ducal and episcopal palace; the royal villa; the mint; etc. The manufactures embrace lead and colored pencils, porcelain and stoneware, hosiery, woolen cloth, leather, machinery, hardware, gloves, sugar, and tobacco. There are also breweries and other works. Ratisbon existed under the Celtic name of *Radasbona* in

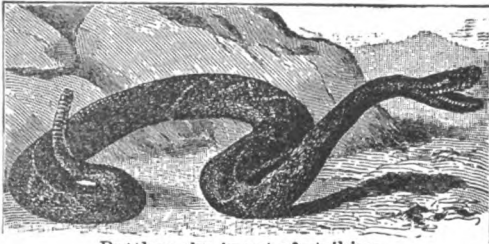


## Rattans

pre-Roman times, and was a Roman frontier fortress under the name of *Castra Regina*. Subsequently it became the residence of the old dukes of Bavaria, rose to the rank of an imperial city, and continued long to be the chosen seat of the imperial diets. The sieges which it has stood number no less than seventeen. Pop. 37,934.

**Rattans'**, the commercial name for the long trailing stems of various species of palm, forming a considerable article of export from India and the Eastern Archipelago. They have all perennial, long, round, solid, jointed, unbranching stems, extremely tough and pliable. All the species are very useful, and are employed for wicker-work, seats of chairs, walking sticks, thongs, ropes, cables, etc.

**Rattlesnake**, a name of various venomous American snakes distinguished from the other members of the family by the tail terminating in a series of articulated horny pieces, which the animal vibrates in such a manner as to make a rattling sound. The function of the "rattle" is dubious. The rattlesnake is one of the most deadly of poisonous serpents, but hogs and peccaries kill and eat it, finding protection in the thickness of their hides and the depth of their layers of fat. A number of species belong to the U. S. and Mexico. East of the Mississippi, the banded rattlesnake is the best known and most dreaded species. It is naturally a sluggish animal, ready to defend itself, but seldom commencing the attack. It feeds on rats, squirrels, small rabbits, etc., and reaches a length of 5 or 6 ft. Other species are the striped rattlesnake, found from Mexico to Brazil; the diamond rattlesnake; the Western



Rattlesnake, in act of striking.

black rattlesnake; the prairie rattlesnake; the horned rattlesnake of the American deserts.

**Rauch** (rouh), CHRISTIAN (1777-1857), one of the most distinguished of German sculptors, b. at Arolsen. He received some instructions from the sculptor Ruhl, at Cassel, afterward proceeded to Berlin to act as one of the royal lackeys, modeled a bust of the queen, and in 1804 went to Rome, where he made the acquaintance of Thorwaldsen and Canova, and obtained the patronage of Wilhelm von Humboldt. He received an invitation in 1811 from the king of Prussia to design a monument of Queen Louisa, and produced a noble work which established the fame of the artist. From this time onward he was the sculptor of an immense number of works in all the branches of the statuary art. He was especially great in ideal figures and in portraiture.

## Rewalpindi

**Raven**, a large bird of the crow family. Its plumage is entirely black; it is above 2 ft. in length from the tip of the bill to the extremity of the tail, and about 52 in. from tip of extended wings. It can be taught to imitate human speech, and in a domestic state is



Raven.

remarkable for its destructiveness, thievishness, and love of glittering things. It flies high, and scents carrion, which is its favorite food, at the distance of several miles; it feeds also on fruit, small animals, etc. It is found in every part of the globe.

**Raven'na**, a town of Italy, capital of the province of the same name, on the Montone, about 4 mi. w. of the Adriatic, and 43 mi. e. by s. of Bologna. The principal edifices are the cathedral, founded in the fourth but rebuilt during the seventeenth century. The manufactures are of little importance. Its harbor was in early times large enough to contain the fleets of Augustus, but it gradually silted up. It is now connected with the Adriatic by the Canale Naviglio at Porto-Corsini. Ravenna is an ancient place, and during the decline of Rome, A.D. 404, Honorius made it the see of the Western Empire. Thereafter it fell into the hands of Odoacer, who in his turn was expelled by Theodoric under whom it became the capital of the Goths. It was recaptured by Belisarius, who made the town and its territory an exarchate. This exarchate was terminated by Astolphus, king of the Lombards, who made Ravenna the metropolis of the Longobardic kingdom in 752. Pepin and Charlemagne, having succeeded in expelling the Lombards, made a present of Ravenna and its exarchate to the pope, with whom it remained till 1860. Pop. 18,571, or as commune 60,573. The province has an area of 820 sq. mi.; pop. 225,764.

**Rewalpindi**, a town of British India, in the Punjab, capital of the district of its own name, situated in the doab formed by the Indus and the Jhilam. The barracks, capable of accommodating 2,500 soldiers, are separated from the native town by the small river Leh. It has a good bazaar and a thriving transit trade between Hindustan and Afghanistan. Pop. 52,975.

## Ray

**Ray**, a family of elasmobranchiate fishes, including the skate and allied forms, recognized by the flattened body and by the extremely broad and fleshy pectoral fins, which seem to be mere continuations of the body. These fishes produce large eggs which are enclosed in cartilaginous capsules quadrilateral in form, with processes at the corners, and known familiarly as "mermaids' purses," etc. The most common members of this group are the thornback ray or skate, so named from the curved spines which arm the back and tail; and the common gray or blue skate, which possesses an acutely pointed muzzle, the body being somewhat lozenge-shaped, and the color ashy gray above. The starry ray is so called from having a number of spines on its upper surface rising from rayed or starlike bases; it reaches a length of 30 in. The sting ray occurs in the Mediterranean Sea, but is also found on the British coasts, having the tail armed with a long spine, serving as a means of defense. Members of the ray family are found in all seas, and more than one hundred species are known.

**Ray**, JOHN (1628-1705), English naturalist. He was educated at Cambridge. In 1667 he was elected a member of the Royal Society. Besides his numerous scientific writings he published several works on divinity and other subjects. In 1844 a society named after Ray, the *Ray Society*, was formed in London for the promotion of natural history by the printing of original works, new editions, rare tracts, translations, etc., relating to botany and zoology, and which has issued a large number of valuable works.

**Razor**, the well-known, keen-edged steel instrument for shaving off the beard or hair. The edge and back of the blade are more or less curved, and the sides are slightly hollowed in grinding. It is usually made with a tang, which is fastened to the handle by a rivet. The handles are made of a great variety of materials. The great center of the razor manufacture is at Sheffield. The savages of Polynesia still use two pieces of flint of the same size, or pieces of shells or sharks' teeth ground to a fine edge for shaving.

**Re'**, or Rhé (râ), ÎLE DE, an island in the Bay of Biscay, about 2 mi. off the coast of department Charente-Inférieure, 6 mi. w. of Rochelle; greatest length 18 mi.; breadth nearly 4 mi.; area 18,250 acres. The coasts on the south and west are lofty and precipitous, but there are several good harbors. Pop. 17,500.

**Read**, OPIE, b. in Nashville, Tenn., 1852. He was educated at Neophogen College in Tennessee. He was engaged in newspaper work in Little Rock, Louisville, Nashville, Cleveland, and was the founder of the *Arkansas Traveler*. Among his books are *Len Gansett*, *A Kentucky Colonel*, *A Tennessee Judge*, *The Wives of the Prophet*, and *The Sucklins*.

**Read**, THOMAS BUCHANAN (1822-1872), painter and poet, b. in Chester co., Pa. His early life was unsettled and wandering. In Boston, in

## Realism

1843, he made his first essay as a poet. His paintings are full of poetic fancies, but the technical treatment is somewhat careless. His poems are marked by a fervent spirit of patriotism and artistic power in the description of American scenery and rural life.

**Reade** (rêd), CHARLES (1814-1884), novelist, son of Mr. John Reade of Ipsden House in Oxfordshire. He was educated at Magdalen College, Oxford. He became first known by his novel of *Peg Woffington*, which he afterward dramatized in conjunction with Tom Taylor under the title of *Masks and Faces*. This was followed by *Christie Johnstone* and *Never Too Late to Mend*, one of his "novels with a purpose," in which he attacked the English prison system. The most scholarly and artistic of his writings, *The Cloister and the Hearth*, dealing with the lives of the parents of Erasmus, appeared in 1861.

**Reading** (red'ing), a parliamentary and municipal borough of England, capital of the county of Berks, on the Kennet, near its confluence with the Thames, 36 mi. w. of London. The industrial establishments include a large and celebrated biscuit factory, iron foundries, breweries, corn mills, etc., and there is a considerable agricultural trade. Pop. 61,000.

**Reading**, co. seat, Berks co., Pa., on Schuylkill river, 58 m. n. of Philadelphia. The surrounding country is largely agricultural. Anthracite coal fields and iron ore are in the vicinity. Railroads: Reading, Pennsylvania, Lebanon Valley, Wilmington & Northern, Schuylkill & Lehigh, and Reading & Columbia. It is noted for its manufactures, especially of iron and steel. Other manufactures are hardware, woollens, hats, textiles, malt liquors, cigars and planing mill products. Pop. 1900, 78,961.

**Real**, in law, pertaining to things fixed, permanent, or immovable. Thus *real estate* is landed property, including all estates and interest in lands which are held for life or for some greater estate, and whether such lands be of freehold or copyhold tenure. So a *real action* is an action brought for the specific recovery of lands, tenements, and hereditaments.

**Realism**, in metaphysics, as opposed to *idealism*, the doctrine that there is an immediate or intuitive cognition of external objects, while according to idealism all we are conscious of is our ideas. According to realism external objects exist independently of our sensations or conceptions; according to idealism they have no such independent existence. As opposed to *nominalism*, it is the doctrine that asserts that general terms like *man*, *tree*, etc., are not mere abstractions, but have real existences corresponding to them. In the Middle Ages there was a great controversy between the realists and the nominalists, the chief controversy which divided the schoolmen into rival parties. The realists maintained that things and not words are the objects of dialectics. Under the denomination of realists were comprehended the Scotists and Thomists, and all other sects of schoolmen, except the followers of Occam and Abelard, who were nominalists.

## Real Schools

**Real Schools** (German, *Realschulen*) are those educational institutions of Germany between the elementary school and the university having for their special object the teaching of science, art, the modern languages, etc.; in contradistinction to the ordinary grammar schools and gymnasiums, in which the classical languages hold a more important place.

**Reaping Machine** (or Reaper), a machine for cutting down standing grain, etc., usually worked by a pair of horses, the cutting machinery being driven by being connected with the wheels on which the machine is drawn over the field. The cutting is effected rather in the manner of a pair of scissors than in that of a scythe, and a series of small toothed wheels have to be connected with the main wheel or wheels so as to produce the fast motion necessary for driving the cutting knives. These knives generally consist of triangular pieces of steel riveted to an iron bar, and are sometimes smooth-edged and sometimes tooth-edged. The



Ancient Reaping Machine.

knife bar projects horizontally from the side of the machine at a short distance above the ground, and moves backward and forward on guides fixed at the back of a number of pointed fingers, which enter the standing grain and guide the straw to the edges of the knives. The motion of the bar being very rapid, the grain is cut down with corresponding speed, and as it is cut it is received on a platform fixed behind the knife bar. In most cases a revolving rake with four inclined arms is attached to such machines, and set in motion by the driving wheel. Two of the arms bring the grain well on to the knife bar, and the others deliver grain cut at the back of the machine. Many of the recent machines are also fitted with a binding apparatus. An endless apron receives the grain as it is cut, and deposits it in a trough on the outer side of the machine. By an ingenious mechanical arrangement the loose straw is caught and compressed by two iron arms; wire from a reel is passed round the sheaf, fastened by twisting, cut away, and the bound sheaf is tossed out of the trough by one of the arms by which it was compressed. Other apparatus are constructed so as to bind with cord, straw rope, etc.

**Reason**, a faculty of the mind by which it distinguishes truth from falsehood, and which enables the possessor to deduce inferences from facts or from propositions, and to combine means for the attainment of particular ends. Reason is the highest faculty of the human mind, by which man is distinguished from brutes, and which enables him to contemplate things spiritual as well as material, to weigh

## Recitative

all that can be said or thought for and against them, and hence to draw conclusions and to act accordingly. In the language of English philosophy the terms reason and understanding are sometimes nearly identical, and are so used by Stewart; but in the critical philosophy of Kant a broad distinction is drawn between them.

**Rebellion**, the taking up of arms, whether by natural subjects or others, residing in the country, against a settled government. By international law rebellion is considered a crime, and all persons voluntarily abetting it are criminals whether subjects or foreigners. When a rebellion has attained such dimensions and organization as to make of the rebel party a state *de facto*, and its acts reach the dimensions of war *de facto*, it is now the custom of the state to yield to the rebels such belligerent privileges as policy and humanity require, and to treat captives as prisoners of war, etc.

**Recaption**, in law, the retaking, without force or violence, of one's own goods, chattels, wife, or children from one who has taken them and wrongfully detains them.

**Receipt**, a written acknowledgment or account of something received, as money, goods, etc. A receipt of money may be in part or in full payment of a debt, and it operates as an acquittance or discharge of the debt only as far as it goes. In the U. S. receipts formerly required internal revenue stamps, but this tax was abolished in 1870.

**Receiver**, a person specially appointed by a court of justice to receive the rents and profits of land, or the produce of other property, which is in dispute in a cause in that court. The name is also given to a person appointed in suits concerning the estates of infants, or against executors, or between partners in business, or insolvents, for the purpose of winding up the concern.

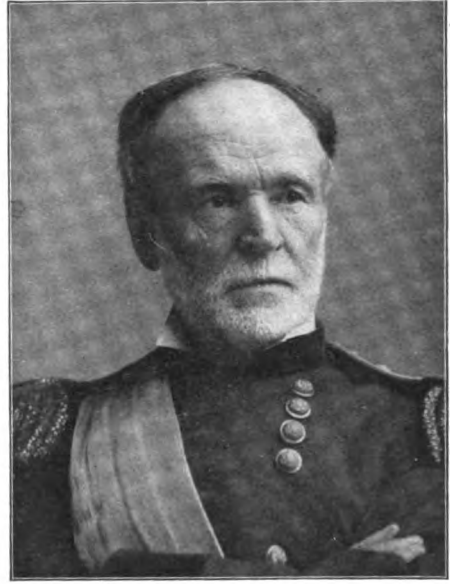
**Receiver of Stolen Goods**, one who takes stolen goods from a thief, knowing them to be stolen, and incurs the guilt of partaking in the crime. In the U. S. the penalty is fixed by statutes in the several states.

**Rechabite**, among the ancient Jews, one of a family or tribe of Kenites, whom Jonadab, the son of Rechab, bound to abstain from wine, from building houses, from sowing seed, and from planting vines (see Jer. 35:6,7). In modern application the Rechabites are a benefit society composed of total abstainers from intoxicating drinks, called the Independent Order of Rechabites.

**Reciprocity**, a term in economics commonly applied in international relationships to the arrangement whereby two nations mutually agree to import to each other certain goods, either duty free or with duties which are equivalent.

**Recitative**, a species of vocal composition which differs from an air in having no definite rhythmic arrangement, and no decided or strictly constructed melody, but approaches in tonal succession and rhythm to the declamatory accents of language. It is used in operas, oratorios, etc., to express some action or pas-





# GENERALS

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## Recognizance

sion, or to relate a story, or reveal a secret or design. There are two kinds of recitative, *unaccompanied* and *accompanied*. The first is when a few occasional chords are struck on an instrument or instruments to give the singer the pitch, and intimate to him the harmony. The second, which is now the more common, is when all, or a considerable portion, of the instruments of the orchestra accompany the singer.

**Recog'nizance**, in law, an obligation of record which a man enters into before some court of record, or magistrate duly authorized, with particular conditions; as to appear at court, or to keep the peace, etc.

**Rec'ord**, specifically, an official record of any writing, or account of any facts and proceedings, whether public or private, entered in a book for preservation. In a popular sense the term *records* is applied to all public documents preserved in a recognized repository. The records or archives of the U. S. are easily accessible, and proper recommendation will open them to any one who wants to use them for scientific purposes. In the legal sense of the term *records* are authentic testimonies in writing, of judicial acts and proceedings, contained in rolls of parchment and preserved, the courts of which the proceedings are thus preserved being called *courts of record*.

**Red**, one of the primary colors, the color of that part of the spectrum which is farthest from the violet. The red rays are the least refrangible of all the rays of light. Red pigments or coloring matters include vermilion, realgar, cochineal, lakes and madders, coal-tar colors, etc. The different forms of oxide of iron are *Indian red*, which is pure, finely ground hæmatite; *Venetian red* and *colcothar*, which are coarser forms of the same substance. *Minium* or lead oxide, and another form of the same substance containing a little carbonate, are known as *Paris red*.

**Red Bird**, the popular name of several birds in the U. S., as the summer red bird, and the Baltimore oriole or hang-nest.

**Redbreast** (or Robin Redbreast), a species of bird belonging to the family of warblers. The red breast of the male is the distinguishing feature of these well-known birds, the female possessing the breast of a duller yellowish-brown color. The young are of a dull yellowish-green color, and want the characteristic breast coloring of the adult.

**Red Cedar**, a species of Juniper found in North America and the West Indies; the heartwood is of a bright red, smooth and moderately soft, and is in much request for the outsoles of black-lead pencils.

**Red Cross Societies** were established immediately after the Geneva Convention of 1863 for the purpose of assisting the wounded in time of war, and a central international committee maintains the connection between the various societies. The distinctive badge of the societies is a red Maltese cross on a white ground. The order of the Royal Red Cross was instituted by Queen Victoria in 1883 as a reward for ladies who have devoted themselves

## Red River

to the work of nursing the sick and wounded in war. The decoration consists of a red Maltese cross bearing the words, "Faith, Hope, and Charity."

**Redeemable Rights**, in law, those conveyances in property or in security which contain a clause whereby the grantor, or any other person therein named, may, on payment of a certain sum, redeem the lands or subjects conveyed.

**Red Fish**, a species of fish found on the Atlantic coast of North America, a large, red fish caught in considerable numbers for food. A smaller species receives the same name, and is called also *Red perch*, *Rose fish*, etc.

**Redgrave**, RICHARD, R. A. (1804-1888), b. in London, became a student of the Royal Academy in 1826; his first notable picture was *Gulliver at the Farmer's Table*; in 1840, when he exhibited *The Reduced Gentleman's Daughter*, he was elected an Associate, and in 1851 became a Royal Academician. From being head master of the Government School of Design he became inspector-general of art schools, and arranged the Museum of Art at South Kensington. He was joint author with his brother of *A Century of Painters*.

**Red Jacket** (Sa-go-ye-wat-ha) (1752-1830), a chief of the Senecas, of the Wolf tribe. In early life he was often employed as a messenger, first among his own people, and during the Revolution as a runner for the British officers on the border. In 1809 he gave information to Erastus Granger, the Indian agent, of the organization by Tecumseh of a league by which the Senecas were to be drawn into a combination against the U. S. In 1810 he visited Washington, and delivered an able speech upon this subject before the secretary of war. Red Jacket was upon the warpath during both conflicts between the U. S. and Great Britain, in the first on the British, and in the second on the American side.

**Red Oak**, Montgomery co., Ia., 60 mi. s.e. of Omaha. Railroads: C. B. & Q., main line and north and south branches. Industries: three flouring mills, iron foundry, calendar co., bee supply factory, and farm implement factory. Surrounding country agricultural. The town was first settled in 1851. Pop. est. 1900, 5,417.

**Redout'**, in fortification, a general name for nearly every class of works wholly enclosed and undefended by re-entering or flanking angles. The word is, however, most generally used for a small, enclosed work of various form—polygonal, square, triangular, or even circular, and used mainly as a temporary field work.

**Red Pine**, a species of pine, also called *Norway Pine*. Its wood is very resinous and durable, and is much used in house and ship building. It produces turpentine, tar, pitch, resin, and lampblack.

**Red River**, a large river, the southernmost of the great tributaries of the Mississippi. It rises in Northern Texas, and has several sources, the chief, besides the main stream, being called the North and South Forks, which unite with it on the boundary of Texas and the



## Red River

Indian Territory. The stream then flows e.s.e., forming the boundary between Texas and the Indian Territory, and between Texas and Arkansas; cuts off a corner of the latter state, and then flowing through Louisiana falls into the Mississippi, 125 mi. n.w. of New Orleans; total course estimated at 1,550 mi.; chief affluents—the Washita, which joins it in Louisiana; and the False Washita, which it receives in the Indian Territory. Much of its course is through rich prairies. About 1,200 mi. of the river are useful for navigation, but its mouth at low water can be entered only by boats drawing 2 ft.

**Red River** (or Song-ka), a large river of Tonquin, formed by the junction of the Leteñ and Song-shai, the former rising in China, the latter in Laos. It flows s.e., passes Hanoi, and falls by several mouths into the Gulf of Tonquin.

**Red River of the North**, a river which rises in Elbow Lake, in Minnesota, flows s. and s.w., and then nearly n., crossing from the U. S. into Manitoba, where it falls into Lake Winnipeg. Its entire length is 665 mi., 525 of which are in the U. S. In Manitoba it receives the Assiniboin, another large stream, at its junction with which stands the town of Winnipeg.

**Red River Settlement**, a settlement formed in 1812 by the Earl of Selkirk on the banks of the above river; repurchased by the Hudson Bay Company in 1836; finally transferred to the Canadian government in 1870, and now made part of the province of Manitoba.

**Red Sea** (or Arabian Gulf), a branch of the Indian Ocean, communicating with it by the Strait of Bab-el-Mandeb, stretching in a n.n.w. direction between Arabia on the e., Abyssinia, Nubia, and Egypt on the w., and connected with the Mediterranean on the n. by the Suez Canal. It forms a long and narrow expanse, stretching for 1,450 mi., with a breadth which averages about 180 mi., but diminishes gradually at its extremities. At the northern end it divides into two branches, one of which, forming the Gulf of Akaba, penetrates into Arabia for about 100 mi., with an average breadth of about 15 mi.; while the other, forming the Gulf of Suez, penetrates between Arabia and Egypt for about 200 mi., with an average breadth of about 20 mi. The shores consist generally of a low, sandy tract, varying in width from 10 to 30 mi., and suddenly terminated by the abutments of a lofty table-land of 3,000 ft. to 6,000 ft. high. Occupying a long, deep valley, this water expanse has gradually been divided into three channels formed by coral reefs and islands. In the main channel the depth reaches in one place 1,054 fathoms, but diminishes toward the extremities to 40 fathoms, while in the harbor of Suez it amounts to only three fathoms. From October to May, when the wind sets steadily from the south, a strong current flows in from the Strait of Bab-el-Mandeb; while from May to October, the north wind continues to blow, which gives the current a southern direction. The result of this is to raise the sea level by several feet north and south alternately. The atmosphere

## Reef

is excessively hot in the warm season. The principal harbors of the Red Sea are, on the African coast, Suez, Kosseir Suakin, and Massowa; and on the Arabian coast, Jedda, Hodeida and Mocha. The through traffic has been immensely increased by the Suez Canal.

**Red Wing**, Goodhue co., Minn. on Mississippi river. 40 m. s.e. of St. Paul. Railroads: C. M. & St. P., C. R. I. & P., D. R. W. & S. Industries: stoneware co., flouring mill, iron foundry, sewer pipe, furniture and lumber cos. Surrounding country agricultural. The town was first settled in 1854, and became a city in 1857. Pop. est. 1900, 7,525.

**Red Wood**. See *Sequoia*.

**Reed**, THOMAS B., American statesman, was born at Portland, Me., Oct. 18, 1839, and graduated at Bowdoin College in 1860; studied law, and practiced for a time in Portland; served a year in the navy during the Civil War as acting assistant paymaster; then practiced law in Portland until he was elected to the lower branch of the Maine legislature. After serving two terms in the legislature, a term in the senate, then three terms as attorney-general of the state, Mr. Reed became solicitor for the city of Portland. His twenty-two years of continuous service in Congress began in 1877. He was elected twelve times and was Speaker of the fifty-first, fifty-fourth and fifty-fifth Congresses. In the fifty-first Congress (1890), Mr. Reed destroyed filibustering by his revolutionary rulings in regard to counting a quorum. These rulings precipitated a fierce parliamentary battle in the House and earned him the title of "Czar" Reed; but soon thereafter the U. S. Supreme Court sustained his decision. In 1896, Reed was a candidate for the Republican nomination for president, but was defeated by McKinley. He resigned from Congress in 1899 in order to associate himself with a New York law firm and accumulate a competence to secure the future comfort of his family. Having in three years gathered a modest fortune, he was preparing to return to Congress at the next election, when he died suddenly in Washington, Dec. 7, 1902. Reed's career was shaped by a self-reliant and uncompromising nature, and not by the arts of diplomacy or the wiles of a politician. He was a strong intellectual force, imperious and intolerant, and given to the most cruel satire. Still he was warmly loved by those who knew him most intimately, and universally respected even by those who feared or hated him. Pl. 4, Vol. I.

**Reef**, a certain portion of a sail between the top or bottom and a row of eyelet holes running across the sail, one or more reefs being folded or rolled up to contract the sail in proportion to the increase of the wind. There are sets of cords called *reef points* attached to the sail for tying up the reefs, and the sail is also strengthened by *reef bands* across it. There are several reefs parallel to each other in the superior sails, and there are always three or four reefs parallel to the foot or bottom of the chief sails which are extended upon booms. Many ships are now fitted with sails

which can, by a mechanical appliance, be reefed from the deck.

**Reeves, JOHN SIMS**, tenor singer, b. at Shooters' Hill, Kent, in 1822; studied singing under Hobbs and T. Cooke; appeared as a baritone on the stage at Newcastle in 1839; joined a company at Drury Lane under Macready as second tenor in 1841; visited the Continent and studied under Bordogni at Paris, and Mazzucato at Milan; and in 1847 returned to England, where he met with great success. He devoted himself more especially to oratorio and ballad singing, and long held the reputation of being the first of modern tenors. He published an autobiography in 1889.

**Referendum**, is a term used in the Swiss Confederation to denote the reference to the citizen voters of resolutions or laws passed by their representatives. If these, when so referred, are accepted by the majority of the voters of the canton, then they become part of the law of the land; but if they are rejected then the rejection is final. The referendum is obligatory where the law or resolution affects the constitution; in other cases it is optional, and may be demanded on the requisition of a certain number of voters.

**Reflection**, specifically, in physics, the change of direction which a ray of light, radiant heat, sound, or other form of radiant energy, experiences when it strikes upon a surface and is thrown back into the same medium from which it approached. When a perfectly elastic body strikes a hard and fixed plane obliquely, it rebounds from it, making the angle of reflection equal to the angle of incidence. This is also the case with light, but the light undergoes the change known as polarization.

**Reformation**, a term that implies purging or purifying. It is in history applied to a revolt in Europe in the sixteenth century against papal supremacy and certain doctrinal tenets of the Church of Rome. For many centuries, Western Europe had been a religious unit under the primacy of the Pope. At one time the Papal power was almost absolute in temporal as well as spiritual matters. Then, as early as the fourteenth century, several of the princes and sovereigns of Europe refused the Pope the right to dictate in temporal or governmental affairs. But previous to the opening of the sixteenth century there had been comparatively few who denied the supreme and infallible authority of the Pope in matters touching religion. Among these were Wycliffe, Huss and Jerome.

The causes leading to the sixteenth century reformation were many. Among others were the great intellectual awakening known as the Renaissance, or revival of learning, and the invention of printing. The Renaissance increased the number of scholars, and the press scattered broadcast over Europe not only the Bible, but the writings of the men who had begun to doubt the scriptural authority for some of the doctrines and ceremonies of the Church, such as devotion to the Virgin Mary, the invoking of saints, confession to a priest

and the nature of the elements used in the Sacrament of the Lord's Supper. These writings of course led to questionings and criticism. In addition to these causes was the need of a thorough reform within the Church itself—a need which was recognized by all earnest and spiritual-minded men. The only difference of opinion was as to the manner in which the work of purification should be effected. A fourth cause may be found in the feeling of jealousy with which the temporal princes regarded the Papal power.

But the actual occasion of the outbreak of the Revolution was the sale of indulgences in Germany. It has always been a tenet of the Catholic Church that indulgences remit penalties due to sin after severe repentance and aid of the Sacrament of Penance. Leo X in 1513, being desirous to complete the great temple of St. Peter's which Julius II had commenced, granted an indulgence to those who would contribute financial aid for that purpose. A certain Johann Tetzel, to whom the Archbishop of Magdeburg had delegated the power of dispensing indulgences in Saxony, carried out his commission in such a way that erroneous views as to the effect of indulgences began to spread among the ignorant and credulous. Hence, many intelligent Christians were led to declaim against the methods of Tetzel. Foremost among those who denounced Tetzel was Martin Luther (which see), an Augustinian monk and teacher of theology in the University of Wittenberg. Tetzel appeared in the vicinity of Wittenberg just at the time of the celebration of a yearly festival when it was customary to post on the church doors bulletins of general interest to the parish. Luther accordingly nailed to the door ninety-five theses warning the people against such traffickers as Tetzel and emphasizing the value of a penitent heart and a loving spirit in making gifts to the church. Copies of these theses were scattered broadcast and all the continent was soon plunged into a tumult of controversy. Luther, meanwhile, devoted himself to further study of the Bible, Church history and canon law, in order to defend the position he had taken. His study resulted in his drifting farther and farther from the Church. His public utterances and writings became bolder and he was soon attacking the entire system and body of teachings of the Church of Rome. He maintained that contrition, confession and absolution were not necessary to secure salvation, denied the infallibility of the councils of the Church, and asserted that the Bible was the only foundation of faith, and bishops, priests and formal worship wholly unnecessary. Owing to his wide reputation for learning and piety, his opinions on these subjects influenced a great many people. At first the Pope Adrian VI did not regard the matter as of serious import; but at length, being convinced that Luther's influence was becoming dangerous, urged the Diet of Nuremberg to institute determined action against him. The Diet, however, felt powerless to carry out the desire of the Pope because of the popularity of Luther

## Reformation

with a number of the German princes. Frederick the Elector, became his great patron, and the states of Anhalt, Mecklenburg, Mansfield, and Prussia, together with fourteen cities, including Nuremberg, Strasburg, Constance, Magdeburg and Brunswick, took sides with him. His writings were, however, condemned as heretical and he himself, if he did not recant his errors in sixty days, was to be seized and sent to Rome to be tried for heresy. Luther publicly burned this communication. In 1521 Luther was summoned to appear before the Diet of Worms and called upon to recant his errors. Refusing to do so, he was pronounced a heretic and outlaw, but was allowed to depart in safety. Frederick, Elector of Saxony, conveyed him privately to the Wartburg Castle. On May 4, 1526, an alliance of the Protestant princes was formed at Torgau under the leadership of John, the Elector of Saxony, and Philip, the Landgrave of Hesse. The Catholics formed a counter-alliance at Dessau, which emphasized a disunion that was destined to exercise an influence in every part of the world. The followers of Luther having become so numerous, it became indispensable to systematize his doctrines and establish a rule of faith. To effect these objects, Philip of Hesse convened a synod at Homburg, in October, 1526. A constitution was there formed which empowered an individual congregation to decide its own ecclesiastical rules. This was adopted in the several Lutheran States, in each of which the chief or head of the government was to be supreme in relation to the Church. To educate the younger element of the people, Luther wrote a catechism of a doctrinal character which was extensively circulated. Because of a dread of Turkish power and a desire to allay, if possible, the dissensions which had arisen in relation to questions of an ecclesiastical character, a Diet was held on April 19, 1529, at Spire. The Catholics submitted what they regarded as moderate claims. Against them the Lutherans protested, which was the origin of the designation *Protestant*, which has since been applied to Lutherans and other dissenters from the doctrines of the Roman Church. In June, 1530, a Diet was held at Augsburg at which Emperor Charles V presided and demanded from the Protestant princes a written confession of faith. This confession, written by Melancthon and approved by Luther, has since been known as the "Augsburg Confession." Articles were framed by the Diet, giving each prince the right to choose between Lutheranism and Catholicism, the religion of the prince to be that of his people. Any prelate on becoming Protestant was to give up his benefice, and the subjects of ecclesiastical princes were to enjoy religious liberty. (See *Schmalkaldic League*.) Thus the Lutherans first received legal recognition, but the issues between Catholics and Protestants were never satisfactorily adjusted until the Peace of Westphalia, which ended the Thirty Years' War (which see) in 1648.

For ten years Luther lived in seclusion at

## Reformation

the Wartburg and busied himself with the translation of the New Testament into German. Meanwhile serious troubles arose in Saxony from the excessive zeal of fanatical reformers. When Luther heard of these things he came forth and, having checked the disturbance, resumed his work in the Church and University. A few years later the revolt broke out afresh. Castles and monasteries were sacked and horrible outrages perpetrated. Luther now undertook a crusade preaching daily throughout the towns of Saxony and the neighboring territories, quelling the uprising and winning adherents to the new faith.

The doctrines of the German reformer found a willing adherent in Gustavus Vasa, who, in 1523, became king of Sweden. Gustavus induced the estates of the realm, in the Diet of Westerås (1527) to sanction the confiscation of the monasteries, and declared himself supreme in matters ecclesiastical. The last remains of Catholic usages were abolished at a second Diet of Westerås in 1544. The first systematic measures in favor of the Reformation in Denmark were taken by Frederick I, instigated by his son Christian, who had studied in Germany and become an enthusiastic Lutheran. At a diet held in 1536 at which no member of the clergy was allowed to be present, the assembly decreed the abolition of the Roman Catholic worship in the Danish dominions. In Hungary, where numerous Germans had settled, bringing Lutheranism with them, the new faith for a short time made rapid progress, especially in the cities and among the nobles. In Poland the Reformation found numerous adherents also. Both in Italy and Spain the idea of the Reformation at first gained some ground among scholars, but never appealed at all to the masses of the people. Even among the scholars who were foremost in advocating certain reforms in the Church there was never any sympathy with the revolt against the Papacy. After the Council of Trent and the subsequent Catholic Reformation, Protestantism practically disappeared from Southern Europe.

In the Swiss states the progress of Protestantism was of much more importance. It found a leader in Ulrich Zwingli, a preacher at Zürich, who, by sermons, pamphlets, and public discussions, induced that city to abolish the old, and inaugurate a new Reformed Church. In this course Zürich was followed by Bâle, Berne, and other cities. Ultimately this movement was merged in political dissensions between the Reformed and Roman Catholic cantons, and Zwingli himself fell in battle (1531). Between Luther and Zwingli there were differences of opinion, chiefly concerning the Lord's Supper, in which the former showed considerable acrimony toward his fellow reformers. The *Institutes of Calvin* formulated the doctrines of a large body of Swiss Reformers, who also accepted Calvin's ordinances regarding church discipline. After many tedious contests Calvin's creed was virtually accepted in the Netherlands and elsewhere.





COSTUMES OF THE TIME OF THE REFORMATION. 1. Man with Waistcoat, low Bodice and small Cloak. 2. Woman with Hood, Gown, embroidered Brisket and Apron. 3. Man dressed in open style, with Cloak, Cap and Cow-mouthed Shoes. 4. Woman with Cape and Hood. 5. Woman with Hoop and mill-stone Collar. 6. Man with Waistcoat resembling the back of a Goose, small Cloak and millstone Collar. 7. Man with Waistcoat, Puffed-up Pants and small Cloak. 8. Woman with Cloak and Colotte.

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## Reformation

In France the movement seemed at first to find powerful support. Margaret, queen of Navarre, sister of King Francis I, and many of the higher ecclesiastics favored the reformed doctrine. The New Testament was translated into French, churches to the number of 2,000 were established by 1558, and the Huguenots, as the Protestants were called, formed a large religious party in the state. Unhappily, however, the religious element was mixed with political and personal hatreds, and in the civil strifes before and after the Massacre of St. Bartholomew (1572) the religious movement declined. The abjuration of Protestantism by Henry IV (1593) was a blow to the Huguenots, and though they obtained toleration and certain privileges by the Edict of Nantes, this was finally revoked in 1685.

The Reformation in England was only indirectly connected with the reform movement in Germany. Wickliffe and the Lollards, the revival of learning, the writings of More, Colet, and Erasmus, the martyrdom of Thomas Bilney, had all combined to render the doctrine and discipline of the church unpopular. This feeling was greatly increased when the writings of Luther and Tyndale's translation of the Bible found eager readers. Then the political element came in to favor the popular reform movement. Henry VIII, in his efforts to obtain a divorce from Catherine, found it necessary to repudiate the papal supremacy and declare himself by act of Parliament (1534) the supreme head of the Church of England. To this the pope replied by threats of excommunication, which were not, however, immediately executed. Yet the breach with Rome was complete, so far, at least, as the king was concerned. Under the new laws of supremacy and treason several of the clergy suffered at Tyburn; Sir Thomas More and Fisher, bishop of Rochester, were beheaded at Tower Hill; and the lesser and greater monasteries were suppressed. At this time there were three chief parties in the state. There was the party who still held the pope to be the supreme head of the church; the king's party, who rejected papal authority but retained the Roman Catholic faith; and there was the reform party, who rejected both the authority and the doctrine of the Roman Church. So far as Henry VIII himself was concerned, the changes made were not due to religious convictions, for in 1539 we find him passing the statute known as the *Six Articles*, which rendered it a penal offense to deny the doctrine of transubstantiation, or to affirm that priests might marry. Yet he allowed the publication of the *Litany* and some forms of prayer in English. With the accession of Edward VI, the Reformation movement made considerable progress. In 1549 the *First Act of Uniformity* enjoined on the Church the use of Cranmer's *First Book of Common Prayer*, and in 1551 the faith of the Reformers was summed up in the *Forty-two Articles of Religion*, which in the reign of Elizabeth were reduced to the *Thirty-nine Articles of the Church of England*. They deny purgatory, reduce the original seven sacra-

## Refraction

ments to two, endorse the Lutheran doctrine of justification by faith alone, repudiate Papal jurisdiction and constitute the sovereign the supreme head of the Church. Thus England in religion became detached from the See of Rome.

In Scotland the first great Protestant reformer was Patrick Hamilton. After Hamilton's death in 1528 George Wishart took up the work he had begun. Wishart was followed by John Knox (which see), who finally became the leading spirit of the Reformation in Scotland. By 1560 the new faith was firmly established in the country. Episcopacy was abolished and the Reformed Church set up, differing in every respect as greatly as possible from the Church of Rome. The doctrines of the church were formulated by Knox in a creed known as the *First Book of Discipline*, which was adopted by the General Assembly of the Church.

Thus Protestantism, the ultimate expression of the Reformation, took root permanently only in Northern Europe, while in Latin Europe the old polity triumphed, and Italy, Spain, France and Austria remained essentially Catholic countries. The effect of the Reformation in the Roman Catholic Church itself was on the whole good, for it compelled her attention to acknowledged abuses, which greater vigilance and a more perfect supervision have now removed.

**Reformatory Schools**, schools instituted for the training of juvenile offenders who have been convicted of an offense punishable by imprisonment. The first reformatory managed under legislative control was the one established in New York in 1824, known as the New York House of Refuge. Its success was so marked that at present there are fifty-six institutions in the U. S. for the reformation of juvenile offenders. The treatment is mostly educational, although in many institutions the inmates are employed at productive labor nearly one half of the time. In some reformatories, in late years, attention has been given to industrial training, with marked success. Reformatories throughout the U. S. compare favorably with the best in other countries.

**Reformed Church**, in general, comprehends those churches which were formed at the Reformation; but the term is specifically applied to those Protestant churches which did not embrace the doctrines and discipline of Luther. The title was first assumed by the French Protestants, but afterward became the common denomination of all the Calvinistic churches on the European Continent. The Reformed Church of America is a body known up to 1867 as the Reformed Protestant Dutch Church, being founded by settlers from Holland and holding Calvinistic doctrines. As the original members spoke Dutch, this language was long used in public worship.

**Refraction**, the deflection or change of direction impressed upon rays of light obliquely, incident upon and passing through a smooth surface bounding two media not homogeneous, as air and water,—or upon rays traversing a



## Refrigeration

medium, the density of which is not uniform, as the atmosphere. A familiar instance of refraction is the broken appearance which a stick presents when thrust partly into clear water, the portion in the water apparently taking a different direction from the other portion. Glass, water, and other solids and fluids each have a different power of refraction, and this power in each case may be expressed numerically by a number known as the *index of refraction*. *Atmospheric refraction* is the apparent angular elevation of the heavenly bodies above their true places, caused by the refraction of the rays of light in their passage through the earth's atmosphere, so that in consequence of this refraction the heavenly bodies appear higher than they really are. It is greatest when the body is on the horizon, and diminishes all the way to the zenith, where it is nothing. *Double refraction* is the separation of a ray of light into two separate parts, by passing through certain transparent mediums, as Iceland spar, one part being called the ordinary ray, the other the extraordinary ray. All crystals except those whose three axes are equal exhibit double refraction.

**Refrigeration.**—In refrigerating machines there is a transference of heat from the substance which is to be refrigerated to the cooling agent, which is evaporating fluid, expanding gas, or a material which promotes evaporation of the liquid to be cooled. If 80.025 pound-Centigrade units of heat be withdrawn from a pound of water at 0° C. (32° F.) it will become a pound of ice at the same temperature. If this heat be withdrawn from the water by an evaporating liquid there are two conditions which must be fulfilled; the evaporating liquid must evaporate very rapidly, and the latent heat of evaporation (i.e., the heat absorbed from outside during evaporation) must be as great as possible. Ether boils at 35.5° C. (95.9° F.), and has at 0° C. (32° F.) a vapor-pressure of 18.4 cm. (7.36 in.) of mercury; at 0° C. it requires 94 lb.-Centigrade units of heat to evaporate a pound of it; and at that temperature its evaporation ought accordingly to be able, if the whole of the heat required for evaporation were withdrawn from water, to freeze 94 ÷ 80.025 times its weight of water at 0° C., so that a ton of ice (2,240 lbs.) would be produced by the evaporation at 0° C. of a minimum of 1,907 lbs. of ether. Alcohol is more advantageous than ether in respect of its higher specific heat, but is preponderatingly less so in respect of its lesser volatility. Liquid ammonia boils at -35° C. (-31° F.), and has at 0° C. a vapor-pressure of 318 cm. (127.2 in.), or more than four atmospheres; it is thus extremely rapidly volatilized at 0° C.; and, as its latent heat of evaporation is as much as 294, the production of a ton of ice would thus only demand the evaporation of a minimum of 610 lbs. of liquid ammonia. Liquid sulphurous acid (boiling-point, -10.8° C. or 12.6° F.; vap. pr. at 0° C., 116.5 cm. or 46.6 in., or about 1½ atm.; lat. h. of evap. 94.56) is also a volatile liquid presenting considerable advantages. The ether is caused to evaporate rapidly by an

## Regiment

air-pump or pumps worked by steam; it cools brine or a solution of calcium chloride, and this cools the water to be frozen or the air to be refrigerated; the ether vapor is condensed by pressure and cold and used over again. Ammonia was first used by Carré in 1860; ammonia gas driven off by heat from its solution in water is condensed in a cooled vessel under its own pressure: the original ammonia vessel is now cooled, and the liquid ammonia rapidly evaporates (its vapor being absorbed), chilling its surroundings. Anhydrous liquid ammonia has been used. M. Raoul Pictet of Geneva has used sulphurous acid, the evaporation of which is hastened by an air-pump. The greatest difficulties in machines of this nature are (apart from chemical action of the liquid employed) the difficulty of making joints to withstand great pressures, and the cost of condensing the evaporated refrigerant. A solution of 300 times its volume of sulphurous acid gas in ordinary ether has been used; the sulphurous acid and the ether are readily evaporated off together by the air-pump, and on condensation the ether settles down first, absorbing the sulphurous acid; so that there are no pressures to deal with, and no sulphuric acid produced which may corrode the metal, but only ethyl-sulphuric acid, which does no great harm.

The air pump or sulphuric acid has also been employed to promote the evaporation of the liquid itself which is to be refrigerated.

Porous jars, used to keep water cool, are among the simplest kinds of refrigerating apparatus; the evaporation at the outer surface of the jar of the water passing through the porous earthenware taking latent heat from the water.

**Regat'ta**, originally a gondola race held annually with great pomp at Venice, and now applied to any important, showy sailing or rowing race, in which a number of yachts or boats contend for prizes.

**Regelation** (rē-je-), refreezing, a name given to the phenomena presented by two pieces of melting ice when brought into contact at a temperature above the freezing point. In such a case congelation and cohesion take place. Not only does this occur in air, but also in water in such a temperature as 100° F. The phenomenon, first observed by Faraday, is of importance in the theory of glacier movement.

**Regent**, a person who governs a kingdom during the minority, absence, or disability of the king or queen. In most hereditary governments the maxim is, that this office belongs to the nearest relative of the sovereign capable of undertaking it; but this rule is subject to many limitations. In the English universities the name is given to members with peculiar duties of instruction or government. In the U. S. there are regents of various educational, benevolent, and public institutions.

**Regiment**, a body of regular soldiers forming an administrative division of an army, and consisting of one or more battalions of infantry or of several squadrons of cavalry, commanded by a colonel and other officers. A

## Regina

regiment is the largest permanent association of soldiers, and the third subdivision of an army corps, several regiments going to a brigade, and several brigades to a division. These combinations are temporary, while in the regiment the same officers serve continually, and in command of the same body of men. The strength of a regiment may vary greatly, as each may comprise any number of battalions. In the U. S. army an artillery regiment consists of twelve batteries, and has 595 enlisted men; a cavalry regiment comprises twelve troops each numbering seventy-eight privates; an infantry regiment contains ten companies, the number of privates varying from fifty to one hundred men in each company.

**Regi'na**, capital of the territory Assiniboia in the Canadian Northwest, a rising town on the Canadian Pacific Railway, well situated near the fertile wheat district of the Qu'apelle Valley. Pop. 2,000.

**Reg'ulus**, name originally applied by the alchemists to antimony. The term is now used in a generic sense for metals in different stages of purity, but which still retain to a greater or less extent the impurities they contained in a state of ore.

**Reg'ulus**, MARCUS ATTILIUS, a Roman general who was made consul a second time in 256 B. C., and was engaged in a war with Carthage, in which he destroyed their fleet and landed his army in Africa. In the following year, however, he was defeated and taken prisoner by the Carthaginians. Sent to Rome on parole by his captors to negotiate peace, Regulus patriotically persuaded his countrymen to continue the war and returned to captivity, where he died under torture.

**Rehan**, ADA, b. in Ireland in 1860. She came to America at the age of six, and first appeared in Albany, N. Y., at the age of sixteen. She appeared with Edwin Booth until 1879, when she was engaged by Augustin Daly. She went to London in 1884, and achieved remarkable success. She is very popular in America.

**Reichenberg** (ri-hen-ber'h), a town of Bohemia, on the Neisse, 56 mi. n.e. of Prague. It is the center of the woolen manufacture of Northern Bohemia, in connection with which there are a great number of establishments in the town and neighborhood. Pop. 28,090.

**Reichstag** (rihs'tâh) (German *reich*, a kingdom, and *tag*, a day, a diet), the imperial parliament of Germany, which assembles at Berlin.

**Reid** (rēd), CAPT. MAYNE (1818-1883), b. in the north of Ireland. His love of adventure brought him to America, where he traveled extensively as hunter or trader; joined the U. S. army in 1845 and fought in the Mexican War. He afterward returned to London, where he became well known as a writer of thrilling juvenile stories, many of them based on his American experiences, such as the *Rifle Rangers*, *Scalp Hunters*, the *War Trail*, the *Headless Horseman*, etc.

**Reid, Whitelaw**, editor, was b. in Xenia, O. in 1837 and educated at Miami University. In 1869 he became managing editor of N. Y. *Tribune* and editor-in-chief and in financial con-

## Relative Rank

trol since 1872. He was minister to France in 1889, in 1892 Republican candidate for vice-president of U. S. and was an American peace commissioner at Paris in 1898. President Roosevelt appointed him in 1905 ambassador to Great Britain to succeed Joseph Choate.

**Reindeer** (rân'dēr), a species of deer found in the northern parts of Europe and Asia. It has branched, recurved, round antlers, the summits of which are palmed; the antlers of the male are much larger than those of the female. These antlers, which are annually shed and renewed by both sexes, are remarkable for the size of the branch which comes off near the base, called the brow antler. The body is of a thick and square form, and the legs shorter in proportion than those of the red-deer. Their size varies much according to the climate, those in the higher Arctic regions being the largest; about 4 ft. 6 in. may be given as the average height of a full-grown specimen. The reindeer is keen of sight, swift of foot, being capable of maintaining a speed of 9 or 10 mi. an hour for a long time, and can easily draw a weight of 200 lbs., besides the sledge to



Reindeer.

which they are usually attached when used as beasts of draught. Among the Laplanders the reindeer is a substitute for the horse, the cow, and the sheep, as he furnishes food, clothing, and the means of conveyance. The caribou of North America, if not absolutely identical with the reindeer, would seem to be at most a well-marked variety of it.

**Relative Rank** IN THE ARMY AND NAVY.—The following is a list of equivalent ranks of combatant officers in the two services of the U. S.:

Army.		Navy.	
General	ranking with Admiral.		
Lieutenant General	"	Vice Admiral.	
Major General	"	Rear Admiral.	
Brigadier General	"	Commodore.	
Colonel	"	Captain.	
Lieutenant Colonel	"	Commander.	
Major	"	Lieutenant Com-	
		mander.	
Captain	"	Lieutenant.	
First Lieutenant	"	Lieutenant (junior	
		grade).	
Second Lieutenant	"	Ensign.	

**Release**, in law, signifies, in general, a person's giving up or discharging the right or action he has or claims to have against another or his lands.

**Relief**, in sculpture and architecture, is the projection of a figure above or beyond the surface upon which it is formed. According to the degree of projection a figure is described as in *high*, *middle*, or *low relief*. High relief (*alto-rilievo*) is that in which the figures project at least one-half of their apparent circumference from the surface upon which they are formed; low relief (*basso-rilievo*) consists of figures raised but not detached from a flat surface; middle relief (*mezzo-rilievo*) lies between these two forms. See *Bas-relief*, *Altorilievo*.

**Religion**, the recognition of a supreme being by acts of love, worship and obedience. Subjectively, it is the virtue which inclines men to adore the Deity; objectively, the collection of those truths and laws which regulate worship. This applies to the Jewish, Christian and other religions. The systematic arrangement and scientific explanation of those truths and laws are called theology. Religion defines man's duty to his Creator and his fellow men, and when human motive emanates therefrom it is morality. Though there are dissimilar forms of divine worship in the various Christian churches, they are all in accord on the question of the Godhead. Each bases its belief in a Creator, a Redeemer and immortality of the soul on the testamentary evidence of the Evangelists. Disagreement on points of doctrine have resulted from divergent textual interpretations of Holy Writ and these have conduced to the formation of churches with varying creeds, each regarding itself as scripturally orthodox. The sacred word religion has, in periods of the past, frequently been abused. In its name, savage and sanguinary excesses have been committed; for Christians, not less than the followers of Mahomet, have had recourse to barbaric cruelty to constrain others to adopt their peculiar forms of belief and worship. But a more exalted comprehension of revealed truth and a constantly progressive civilization have caused modern religious propagandists to combat error and achieve conversion by the moral weapon of theological conviction rather than the sword.

Religions are divided into two great classes, polytheistic and monotheistic; that is, those recognizing a plurality of deities and those that recognize but one. In some religions magic, fetichism, animal worship, belief in ghosts and demons, etc., play an important part. The most remarkable religious conquests in history are that of Judaism which effected the establishment of a national religion, originally that of a single family, in a hostile territory by force of arms and expulsion or extinction of the previous inhabitants; that of Christianity, which, by the power of persuasion and in the midst of persecution, overthrew the polytheism of the most enlightened nations of antiquity; that of Mohammedanism, which, partly by persuasion, but more by force, established itself on the site of the Eastern Empire of Chris-

tianity, and extended its sway over a population partly idolatrous and partly Christian; that of Buddhism, which, being expelled by persecution from India, where it had widely disseminated itself by conversion, spread itself also by moral suasion over the larger portion of Eastern Asia. All these religions, with the exception of Buddhism, which may perhaps be considered atheistic, are monotheistic systems.

Various estimates have been made of the diffusion of the various religious creeds over the world. These are necessarily very loose and often differ widely from each other. A recent estimate is the following: Roman Catholics, 220,000,000; Protestants, 143,000,000; Eastern Churches, 81,000,000; Mohammedans, 215,000,000; Buddhists, 147,900,000 Brahmanists, 175,000,000; followers of Confucius, 80,000,000; Sinto Religion, 14,000,000; Jews, 8,000,000.

**Religious Liberty** (or Liberty of Conscience), is the recognition and assertion by the state of the right of every man, in the profession of opinion and in the outward forms and requirements of religion, to do or abstain from doing whatever his individual conscience or sense of right suggests. Religious liberty is opposed to the imposition by the state of any arbitrary restrictions upon forms of worship or the propagation of religious opinions, or to the enacting of any binding forms of worship or belief. The limit of religious liberty is necessarily the right of the state to maintain order, prevent excesses, and to guard against encroachments upon private right.

Among the nations of ancient times the idea of religious liberty was almost totally lacking, the individual being subject to the king in religious as well as civil matters. During the early centuries of the Christian era the Christian religion was tolerated, and the first determined effort to exterminate it was made in the reign of Diocletian. Not until after the conversion of the Emperor Constantine was full toleration of religious worship granted to all persons. Shortly afterward an edict followed prohibiting the worship of heathen gods and establishing Christianity as the state religion of the Roman Empire. Until the Protestant Reformation the question of religious liberty scarcely arose, for the authority of the Catholic Church was almost universally recognized throughout Europe. Nor did the Reformation introduce the principle of religious liberty into Europe. For every prince, whether Catholic or Protestant, believed that unity of faith among his subjects was essential to the integrity of the state. The American colonists brought with them some of the Old World ideas on this subject, but there was gradually developed in the new country a spirit of tolerance such as hitherto had existed in no land. The influence of the American idea of religious liberty has exerted a powerful influence in other countries. To-day religious liberty practically exists in most European countries and in many other parts of the world.

**Remainder**, in law, is a limited estate or tenure in lands, tenements, or rents, to be enjoyed after the expiration of another particular estate.



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COSTUMES OF THE RENAISSANCE PERIOD. 1. Man with Gown and Cloak, 11th Century. 2. Woman with Chaplet, Gown and Surcoat, 11th Century. 3. Man with Cowl, short Coat and Sword-belt, 14th Century. 4. Woman with Frill-hood, Gown and Cloak, 14th Century. 5. Man in so-called shaggy style with Turban-Cap and short Cloak, 15th Century. 6. Woman in shaggy style, with Jagged Hood, 15th Century. 7. 8. Man and woman in costume with Bell Ornaments.

## Renaissance Architects

[illegible][illegible]





1. Man with Turban-Cap and short Cloak, 15th Century. 2. Man with Turban-Cap and short Cloak, 15th Century. 3. Man with Turban-Cap and short Cloak, 15th Century. 4. Man with Turban-Cap and short Cloak, 15th Century. 5. Man with Turban-Cap and short Cloak, 15th Century. 6. Man with Turban-Cap and short Cloak, 15th Century. 7. Man with Turban-Cap and short Cloak, 15th Century.

## Rembrandt

**Rem'brandt** (in full, REMBRANDT HERMANZ VAN RYN) (1606-1669), the most celebrated painter and etcher in the Dutch school, was b. at Leyden. In 1630 he removed to Amsterdam, which he never left. In 1634 he married Saskia van Uilenburg, daughter of the burgomaster of Leeuwarden. Rembrandt has rendered her famous through numerous etched and painted portraits. Rembrandt became the master of numerous pupils, Gerard Douw being among the number. His paintings and etchings were soon in extraordinary demand, and he must have acquired a large income by his work; but his expenditure seems to have been greater; and in 1656 he was declared bankrupt, his property remaining in the hands of trustees till his death. He had married the second time, but the second wife's name is not known. Rembrandt excelled in every branch of painting, and his treatment of light and shade has never been surpassed. His works display profound knowledge of human nature, pathos, tragic power, humor, and poetic feeling. His eminence in portraiture may especially be noted, in portrait groups in particular. His artistic development may be broadly divided into three periods. To the first of these (1637-39), which shows less mastery than the succeeding two, belong his *St. Paul, Samson in Prison, Simeon in the Temple, Lesson in Anatomy* (Tulp the anatomist), and various character portraits of his wife as *Queen Artemisia, Bathsheba, The Wife of Samson*, etc. To his middle period (1640-54) belong *The Night Watch, The Woman Taken in Adultery, Tobit and his Wife, The Burgomaster and his Wife, Descent from the Cross, Portrait of Coppenol, Bathsheba*, and *Woman Bathing*. Among the works of his last period (1655-68) may be mentioned *John the Baptist Preaching, Portrait of Jan Six, The Adoration of the Magi, the Syndics of Amsterdam*, and various portraits of himself. His etchings in technique and deep suggestion have not yet been equaled. He was the first and as yet the greatest master of this department of art. Some of them have been sold at extraordinary prices—*Jesus Healing the Sick*, known as the Hundred-guilder Piece (1st state), having been sold at the Buccleuch sale in 1887 for 1,300 guineas; and two others, a *Coppenol* and *Jesus before Pilate*, bringing 1,190 and 1,150 guineas respectively. Of his works there are about 280 paintings and 320 etchings extant, dating from 1625 to 1668. Pl. 30, Vol. IV.

**Remenyi**, EDOUARD, b. in Hungary in 1830. He received his musical education at the Conservatory of Vienna under Böhm. He was compelled to leave Austria on account of his complicity in the insurrection against Austrian rule. He made several tours through the U. S., the last being in 1893. Died May, 1898.

**Remsen**, IRA, b. in New York City in 1846. He was educated at Columbia College, and studied abroad in the universities of Munich and Göttingen. He returned to the U. S. in 1872 and became professor of chemistry and physics in Williams College, Massachusetts. He went to Johns Hopkins when that institution was founded in 1876 as professor of

## Renaissance Architecture

chemistry. As a chemist he ranks second to none in the United States. He was elected president of Johns Hopkins June 4, 1901. Among the books which he published are, *Theoretical Chemistry, Organic Chemistry, Introduction to Chemistry, and Elements of Chemistry*.

**Renaissance**, a term applied, in its more specific sense, to a particular movement in architecture and its kindred arts, but in a general sense to that lost stage of the Middle Ages when the European races began to emerge from the bonds of ecclesiastical and feudal institutions, to form distinct nationalities and language; and when mediæval ideas became largely influenced by the ancient classic arts and literature. It was a gradual transition from the Middle Ages to the modern, characterized by a revolution in the world of art and literature brought about by a revival and application of antique classic learning. The period was also marked by a spirit of exploration of lands beyond the sea, by the extinction of the scholastic philosophy, by the new ideas on astronomy promulgated by Copernicus, and by the invention of printing, gunpowder, etc.

**Renaissance Architecture**, a style which originated in Italy in the first half of the fifteenth century, and afterward spread over Europe. Its main characteristic is a return to the classical forms and modes of ornamentation which had been displaced by the Byzantine, the Romanesque, and the Gothic. The Florentine Brunelleschi (d. 1446) may be said to have originated the style, having previously prepared himself by a careful study of the remains of the monuments of ancient Rome. His buildings are distinguished by the use of the three classical orders, with much of the classical severity and grandeur, but in design they are made conformable to the wants of his own age. He sometimes retains, however, elements derived from the style which he superseded; as for instance in his masterpiece, the cathedral of Florence, where he makes a skillful use of the pointed Gothic vault. From Florence the style was introduced into Rome, where the noble and simple works of Bramante (d. 1514) are among the finest examples of it, the chief of these being the palace of the Chancellery, the foundations of St. Peter's, part of the Vatican, the small church of San Pietro in Montorio. It reached its highest pitch of grandeur in the dome of St. Peter's, the work of Michael Angelo (d. 1564), after whom it declined. Another Renaissance school arose in Venice, where the majority of the buildings of the sixteenth and seventeenth centuries are distinguished by the prominence given to external decoration by means of pillars and pilasters. From this school sprung Palladio (1518-80), after whom the distinctive style of architecture which he followed received the name of Palladian. The Renaissance architecture was introduced into France by Lombardic and Florentine architects about the end of the sixteenth century, and flourished there during the greater part of the following century, but especially in the first half under Louis XII and Francis I. The early French



## Renan

architects of this period, while adopting the ancient classical orders and other features of the new style, still retained many of the features of the architecture of the preceding ages; later on they followed classical types more closely, as in the palaces of the Louvre. As applied to ecclesiastical edifices, the Renaissance style of architecture is charged in France as elsewhere with depriving them of religious character. Toward the end of the sixteenth century the Renaissance degenerated in France as it had done in Italy, and after passing through the degenerate phase known as the Baroque style, it gave rise to the insipid and over-decorated productions of the so-called Rococo style. Into England the Renaissance style was introduced during the time of Elizabeth, and it is there represented by the works of Inigo Jones (1572-1652), Sir C. Wren (1632-1723), and their contemporaries, St. Paul's, London, being a grand example of the latter architect. A great many of the princely residences of Germany belong to the Renaissance style, but not to its best period. Renaissance architecture presents many phases and varieties of style. It has been much used in modern work. The prevailing style employed in rebuilding Paris is Renaissance.

**Renan** (rè-nān), JOSEPH ERNEST (1823-1892), orientalist, historian, and essayist, was b. at Tréguier, in Brittany, and studied at the seminary of St. Sulpice, Paris, but in 1845 gave up all intention of becoming a priest, and devoted himself to historical and linguistic studies. In 1862 he was appointed professor of Hebrew, Chaldee, and Syriac in the Collège de France, but the skeptical views manifested in his *Vie de Jésus* (1863) raised an outcry against him, and he was removed from his chair, to be restored again, however, in 1871. This work, the publication of which caused intense excitement throughout Europe, was the first part of a comprehensive work on the *History of the Origins of Christianity*. Renan's latest important work is the *History of the People of Israel till the Time of King David*.

**René** (rè-nā') (or Rena'tus I of Anjou) (1409-1480), titular king of Naples, second son of Louis II of Naples, duke of Anjou, and Yolande, daughter of John, king of Aragon, was b. at Angers. Having in 1420 married Isabella, daughter of Charles II, duke of Lorraine, on the death of his father-in-law in 1431, he laid claim to that dukedom; but Count Antony of Vaudemont, son of the brother of Charles II, contested his right, drove him out of Lorraine, captured him, and held him a prisoner for several years. In 1434 his elder brother, Louis III of Anjou, who had been in actual possession of the throne of Naples and Sicily, died and left to him Provence, Anjou, Naples, Sicily, and Jerusalem. In 1437 René bought his liberty and the acknowledgment of his right to Lorraine for 400,000 florins, and in the following year he led an army to Naples, where his claims were disputed by Alfonso, king of Aragon. René was unsuccessful, and in 1442 returned to Lorraine, the government of which he gave up to his son John.

## Rent

**Rennes** (renn), a city of France, formerly capital of Brittany, at present capital of the department of Ille-et-Vilaine, situated at the confluence of the rivers Ille and Vilaine. It is traversed from east to west by the Vilaine, which divides it into the High and the Low Town, and is crossed by four bridges. The High Town is handsome and regular, having been rebuilt after a dreadful conflagration which took place in 1720. The most remarkable buildings are the cathedral, a modern Grecian building, the Palais de Justice, the Hôtel de Ville, and the Lycée. The industries include sailcloth, linen, shoes, hats, stained paper, etc. Rennes is the seat of an archbishop, the headquarters of a corps d'armée, and has a large arsenal and barracks. Duguesclin and Sainte Foix were b. here. Pop. 52,614.

**Rennie**, JOHN (1761-1821), a celebrated civil engineer, son of a farmer, was b. at Phantassie, East Lothain. In London he gained a great reputation, and was regarded as standing at the head of the civil engineers of Great Britain. Numerous bridges, canals, docks, and harbors bear testimony to his skill; among others, Southwark Bridge, Waterloo Bridge, and London Bridge across the Thames.

**Rennie**, SIR JOHN (1794-1874), younger son of the preceding, was b. in London, where he also received his education. He was considered the highest authority of his time on all questions connected with hydraulic engineering, and was the author of an important work on harbors.

**Rent**.—In popular language the term rent is usually applied to whatever is annually paid by a farmer or householder to his landlord, but in political economy it has a more limited meaning. Ricardo defined it to be "that portion of the produce of the earth which is paid to the landlord for the use of the original and indestructible powers of the soil." This definition has been modified by later writers, who are, however, in substantial agreement with Ricardo as to the law of rent. Mill, for example, includes under the term rent the return made to capital spent once for all in giving the land a permanent increase of productiveness, as in the Bedford Level, on the ground that equally fertile land commands the same rent, other things being equal, whether its fertility is natural or acquired. Professor Cairnes, in his *Character and Logical Method of Political Economy* (1875), defines rent still more broadly as the "permanent surplus value," in certain branches of industry, "beyond what is sufficient to replace the capital employed in production, together with the usual profits which happen to prevail in the country." Professor Sidgwick declines to follow Mill in "separating from agricultural rent whatever part of the price paid for the use of the farm is interest on the recurrent expenditure on buildings, fences, etc., necessary to maintain the fitness of the farm for agricultural uses. The owner of the farm cannot avoid spending it unless he wishes to sacrifice a large part of the value of his land; the yield of this capital therefore does not



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vary—as Mill seems to suggest—with the current rate of interest; and there seems no adequate reason for separating it from the yield of the land in which the capital is invested, when we are considering the laws determining normal rent and interest at any given time." The definition of rent which is probably least open to criticism and, at the same time, most nearly corresponds to the ordinary significance of the word, is that given by Professor Sidgwick himself in the work just quoted: "The normal rent per acre of any piece is the surplus of the value of its produce over the value of the net produce per acre of the least advantageous land that is profitable to cultivate, provided the amount of capital employed is the same in both cases."

Several theories have at different times been advanced in explanation of rent. The great French economists of the eighteenth century traced it to the superior productiveness of agricultural as compared with every other form of industry. Nature, they said, co-operates here with human effort, and there consequently arises in agriculture a *produit net*, or rent, which has no place in other fields of human industry. But apart from other serious objections to this theory, it ignores the question of price, on which mainly depends the production of surplus value, and therefore fails to solve the problem of rent. Adam Smith himself added little or nothing to the elucidation of this subject, and indeed fell into the serious error of supposing that rent ordinarily enters into the price of agricultural produce. This can only happen, as Professor Cairnes has pointed out, under a monopoly of land by the government, or by a combination of owners. There are instances of rents paid in new countries, as in Australia, while yet all even of the best lands were not taken up, in consequence of all the available land being held by the government, which was thus enabled to fix a monopoly price. In such a case "the price of corn rises because the government demands a rent. In the ordinary case the landlord demands a rent because the price of corn is high."

The true theory of rent was first laid down by Dr. Anderson, a Scotch writer, in a work published barely a year later than Smith's *Wealth of Nations*, but it failed to attract attention. Nearly forty years later it was almost simultaneously rediscovered by Sir Edward West, Malthus, and Ricardo. And, as Professor Walker observes, "the cogency with which the arguments of the last-named were put, and the stringency with which the principle involved was applied, have served to affix his name permanently to the doctrine, alike in England, in America, and on the continent of Europe."

Probably the best concise statement of the Ricardian law of rent is the following by the above-quoted Prof. F. A. Walker, of Boston: "Rent arises from the fact of varying degrees of productiveness in the lands actually contributing to the supply of the same market, the least productive land paying no rent, or a rent

## Rent

so small that it may be treated as none. The rent of all the higher grades of land is measured upward from this line, the rent of each piece absorbing all the excess of produce above that of the no-rent land." In the above phrase, "varying degrees of productiveness," is included, not only the difference in the fertility of the land, but any other causes, such as distance from, or difficulty of excess to, the market by which the net productiveness of a tract of land for the purposes of rent may be reduced in comparison with another tract of equal fertility. The law of rent thus stated requires but little demonstration. If the demand for agricultural produce, as shown by the price obtainable, be such as to make it worth while to cultivate soils of low productiveness, on which therefore the crop is raised at the highest cost, all land on which the cost of production is less must yield a surplus value which, in proportion as competition is free, falls to the landlord, and constitutes normal or economic rent. It is evident that this rent must increase as cultivation is forced down to inferior soils under the pressure of demand and consequent increase of price. On the other hand, anything which tends to equalize the productiveness of the different tracts of land supplying the same market, either by cheapening carriage or improving agriculture, tends to reduce rent. The recent decline of rent in England under the competition from different parts of the world, which improved means of communication have brought into play, is a case in point.

A common objection to the law of rent is that it presupposes the existence of no-rent lands. Many farms include what are practically no-rent pieces of land, although in letting an average rent is charged for the whole—taking the bad with the good. There are other tracts, too, which are incapable of yielding an agricultural rent, and therefore for the purposes of the present discussion no-rent lands, although they are let for sporting or similar purposes.

Although the Ricardian law of rent has been fully accepted by the principal economists, it has met with much opposition and misunderstanding. Its principal opponent has been H. C. Carey, an American economist, who declared that it was "universally false," and maintained that "there is not throughout the U. S. a county, township, town, or city, that would sell for cost, or one whose rents are equal to the interest upon the labor and capital expended," and therefore he contended there is no such thing as economic rent, i. e., rent proper as distinguished from interest. But, as Professor Walker conclusively shows in his *Land and Its Rent*, already quoted, this argument proves too much. "If so much has been lost, why not more? And if more, why may not Ricardo's first element (rent proper) enter after all?" Our space will not permit us to enter into an examination of Carey's views, nor of those of the eloquent French economist, F. Bastiat, who denies the Ricardian law, and endeavors to establish a wholly independent basis for rent which shall make its payment consist

## Renunciation

with his glowing theory of the mutuality of services. The arguments of both these writers will be found fully discussed and refuted by Professor Walker in the work above referred to.

Economic rent, as above described, must not be supposed to be necessarily and always exacted. It represents the share which the landlord is able to obtain under free competition, although as a matter of fact "the U. S. and Ireland," as Professor Walker observes, "are probably the only two considerable countries in which rents closely approximating to true competitive rents have been habitually paid."

**Renunciation**, in law, the act of giving up a right. It is applied to the act of an executor who declines to take probate of the will of his testator. Renunciation by an heir is, where, rather than enter upon the property to which he is entitled, and thus become liable for the encumbrances upon it, he prefers to renounce his character of heir.

**Renwick**, JAMES, LL.D. (1792-1863), physicist, b. in Liverpool. He was educated at Columbia College, New York, and from 1820 to 1850 was professor of physics and chemistry in that institution. He wrote a number of works connected with the sciences in which he had to give instruction, such as *Outlines of Natural Philosophy*; *Treatise on the Steam Engine*; *Elements of Mechanics*, etc.; also *Life of John Jay and Alexander Hamilton*; *Life of De Witt Clinton*; besides editing various other works. His son JAMES, b. 1819, is a distinguished architect, having designed many churches and other buildings, including the Roman Catholic cathedral of New York, the Smithsonian Institution, Vassar College, etc.

**Repairs**, in law, is the term denoting the repairs done to a house or tenement by the landlord or tenant during the currency of a lease. In the U. S. unless otherwise stipulated, repairs are made by the landlord; he must keep the property in tenantable condition.

**Replev' in**, in law is an action brought to recover possession of goods illegally seized, the validity of which seizure it is the regular mode of contesting.

**Reporting**, CONGRESSIONAL, is the process by which the debates in Congress are made known to the public. An official corps of reporters is employed in the Senate and House of Representatives, and their full *verbatim* notes of all debates and proceedings, taken in shorthand, are printed next morning in the *Congressional Record*.

**Reports**, in regard to courts of law, statements containing a history of the several cases, with a summary of the proceedings, the arguments on both sides, and the reason the court gave for its judgment. In the U. S. the Supreme Court Reports form a complete series from 1792 to date. Each state also publishes a regularly authorized series of reports of decisions of its judicial tribunals of last resort.

**Representative Government** is that form of government in which either the whole of a nation, or that portion of it whose superior intelligence affords a sufficient guarantee for the proper exercise of the privilege, is called

## Reproduction

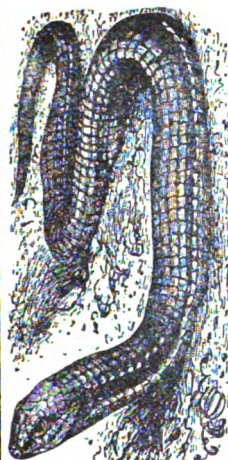
upon to elect representatives or deputies charged with the power of controlling the public expenditure, imposing taxes, and assisting the executive in the framing of laws.

**Reprieve** (re-prēv'), the suspension of the execution of the sentence passed upon a criminal for a capital offense. A reprieve may be granted in various ways: First, by the mere pleasure of the executive; second, when the judge is not satisfied with the verdict, or any favorable circumstance appears in the criminal's character; third, when a woman capitally convicted pleads pregnancy; and lastly, when the criminal becomes insane.

**Reproduction**, the process by which animals perpetuate their own species or race. Reproduction may take place in either or both of two chief modes. The first of these may be termed *sexual*, since in this form of the process the elements of sex are concerned—male and female elements uniting to form the essential reproductive conditions. The second may be named *asexual*, since in this latter act no elements of sex are concerned. The distinctive character of sexual reproduction consists in the essential element of the male being brought in contact with the essential element of the female, whereby the latter is fertilized or impregnated, and those changes thereby induced which result in the formation of a new being. Whether these elements, male and female, be furnished by one individual or by two—or in other words whether the sexes be situated in separate individuals or not—is a fact of immaterial consequence in the recognition and definition of the sexual form of the process. The reproductive process, therefore, may be I, *Sexual*, including A, Hermaphrodite or Monœcious parents possessing male or female organs in the same individual, and these may be *a*, self-impregnating (for example, the tape-worm), or *b*, mutually impregnating (for example, the snail); and B, Dioecious parents, which may be *a*, Oviparous (for example, most fishes, birds, etc.), *b*, Ovo-viviparous (for example, some amphibians and reptiles), or *c*, Viviparous (for example, mammals). Or the reproductive process may be II, *Asexual*, including the processes of A, Gemmation or budding (internal, external, continuous, or discontinuous), and B, Fission (transverse, longitudinal, irregular).

The most perfect form of the reproductive process is best seen in the highest or vertebrate animals, where the male elements are furnished by one form, and the female elements by another. The male element, with its characteristic sperm-cells or spermatozoa, is brought into contact with the female ova in various ways. The ova when impregnated may undergo development external to the body of the parent, and be left to be developed by surrounding conditions (as in the eggs of fishes); or the parent may (as in birds) incubate or hatch them. Those forms which thus produce eggs from which the young are afterward hatched are named *oviparous* animals. In other cases (as in land salamanders, vipers, etc.) the eggs are retained within the parent's body until such time as the young are hatched, and these





4 Lizard of South-eastern Europe  
(*Pseudopus pallasi*)



5 Common Chameleon (*Chamaeleo vulgaris*)



6 Head of the Mountain Chameleon  
(*Chamaeleo montium*)



Gland-headed Lizard (*Coniophanes subcristatus*)  
Quill-tailed Lizard (*Tropidurus grayii*)  
Combed Sea Lizard (*Amblyrhynchus cristatus*)



forms are hence named *ovo-viviparus*; while (as in mammalia alone) the young are generally completely developed within the parent's body, and are born alive. Such animals are hence said to be *viviparous*. In the higher mammals, which exhibit the viviparous mode of reproduction in fullest perfection, the mother and embryo are connected by a structure consisting partly of foetal and partly of maternal tissues, and which is known as the *placenta*. In the tapeworms we find familiar examples of normal hermaphrodite forms. Each segment or *proglottis* of the tapeworm—which segment constitutes of itself a separate zooid or part of the compound animal—contains a large branching ovary, developing ova or eggs, and representing the female organs; and also the male organ or testis. These organs between them produce perfect or fertilized eggs, each of which under certain favorable conditions is capable of developing into a new tapeworm. The snails also form good examples of hermaphrodite animals, and illustrate organisms which require to be mutually impregnated in order to produce fertilized eggs—that is to say, the male element of one hermaphrodite organism must be brought in contact with the female element of another hermaphrodite form before the eggs of the latter can be fecundated.

**Reptiles** (or Reptilia), a class of vertebrates, constituting with the birds, to which they are most closely allied, Huxley's second division of vertebrates, Sauropsida. Reptiles, however, are generally regarded as occupying a separate place in the animal kingdom, between birds and amphibians. Reptiles differ from amphibians chiefly in breathing through lungs during the whole period of their existence; and from birds in being cold-blooded, in being covered with plates or scales instead of feathers, and in the forelegs (as far, at least, as living reptiles are concerned) never being constructed in the form of wings.

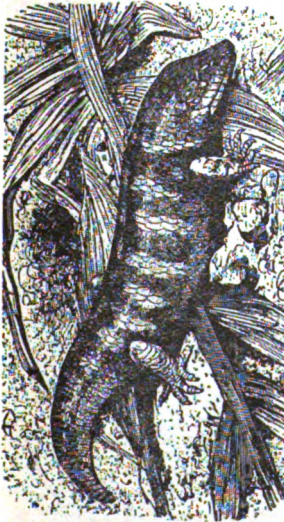
The class may be divided into ten orders, four of which are represented by living forms, while six are extinct. The living orders are the Chelonina (tortoises and turtles), the Ophidia (serpents and snakes), the Lacertilia (lizards), and Crocodilia (crocodiles and alligators). The extinct orders are: Ichthyopterygia (Ichthyosaurus), Sauropterygia (Plesiosaurus), Anomodontia (Rhynchosaurus, etc.), Pterosauria (Pterodactylus), Deinosaoria (Megalosaurus, etc.), and Theriodontia. The class is also divided into two sections, Squamata and Loricata, according as the exo-skeleton consists simply of scales, or of bony plates in addition to the scales.

The exo-skeleton varies greatly in its development throughout the class. As in the tortoises and turtles and crocodiles it may attain, either separately or in combination with the endo-skeleton, a high development. In serpents and many lizards it is moderately developed, while in some lizards the skin is comparatively unprotected. The skeleton is always completely developed and ossified. The vertebral column in the quadrupedal forms is divided into four or five regions, less distinctly

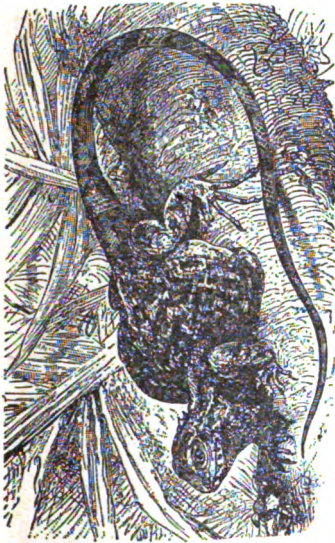
differentiated, however, than in the mammals. The ribs differ considerably in their mode of attachment to the vertebræ, but are always present, and in a state of greater development than in the amphibians. The body, except in the case of the tortoises, is of an elongated form. The limbs are very differently developed in the different species. In the serpents and some lizards they are completely wanting or atrophied; in other lizards they are rudimentary; while in the remainder of the class sometimes the anterior and sometimes the posterior limbs are developed, and not the others. In no case are the limbs developed to the extent to which they are developed in birds and quadrupeds, these members seldom being of sufficient length to keep the body from the ground. In some of the forms, living or extinct, the limbs are modified for swimming or for flight. The lower jaw is connected with the skull through the intervention of a quadrate bone, and, as this often projects backward, the opening of the mouth is very great, and may even extend beyond the base of the skull. Teeth, except in the turtles and tortoises, are present, but are adapted rather for seizing and holding prey than masticating food, and, except in the crocodiles, are not sunk in sockets. The skull possesses a single occipital condyle, by means of which it articulates with the spine. The brain is small compared with the size of the skull. The muscular system is developed more like that of the birds and mammals than that of the amphibians or fishes. The intestinal tract is generally differentiated into an oesophagus, stomach, small intestine, and large intestine. It terminates in a *cloaca*, which is also common to the efferent ducts of the urinary and generative systems. In some forms (as snakes) the stomach like the gullet, is capable of great distention. The heart has only three cavities, viz., two separate auricles and a single ventricular cavity, usually divided into two by an incomplete partition. Respiration is always performed by the lungs, which are highly organized, and often attain a great size. The ova are in general retained within the body of the parent until the development of the young has proceeded to a greater or less extent, and then expelled and left to the heat of the sun; but in some forms (as snakes and lizards) they are hatched in the interior of the body. Reptiles are found in greatest number, and in most typical form and variety, in the warm or tropical regions of the earth. During winter, or in the colder seasons of the year, most reptiles hibernate, and snakes are notable as periodically moulting their skin or epidermis. See the different orders in separate articles.

**Repub'lic**, a constitution in which the supreme power in the state is vested in the people. According to the constitution of the governing body a republic may therefore vary from the proudest aristocracy to the most absolute democracy. In the small states of ancient Greece the supreme power was vested in the whole body of the citizens, who met in common assembly to enact their laws. In the oligarchic





1. Shink, Arabian Lizard (*Scincus officinalis*).



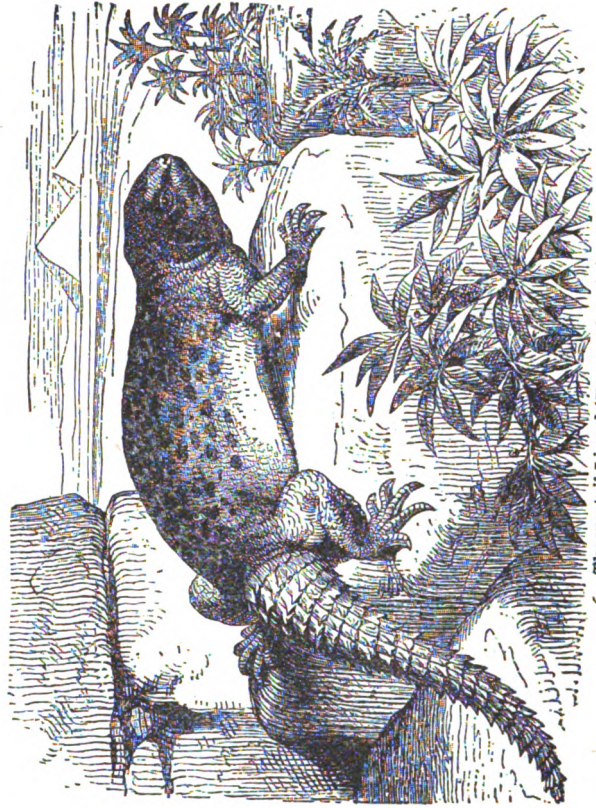
2. Flying Dragon (*Draco volans*).



3. Horned Lizard of Texas (*Phrynosoma orbiculare*).



4. Flying Lizard of East India (*Ptychozoon homalocephalum*).



6. Thorny-tail Lizard (*Uromastix spinipes*).



5. Lizard of the Nile (*Monitor niloticus*).



republics of Genoa and Venice the supreme power was consigned to the nobles or a few privileged individuals. In all modern republics the representative system prevails. Besides the diminutive republics of San Marino, in Italy, and Andorra, on the south side of the Pyrenees, the only republics in Europe at the present day are those of Switzerland and France. Switzerland has been a republic ever since it liberated itself from German rule; and France has been thrice a republic—from 1793 to 1804, from 1848 to 1852, and from 1870 to the present time. Holland was a republic from the separation of the seven provinces from Spain until 1815; Great Britain was nominally a republic from 1649 to 1660; Spain possessed a republican government in 1868-69; and in 1873-74. In the Western Hemisphere the republican form of government prevails among the independent states. The U. S. is a federative republic, consisting of a number of separate states united by a constitution, and having a central government, with power to enact laws binding on all the citizens. Mexico has been a republic since 1824, except during the short-lived empire from 1863 to 1867. Brazil has only been a republic since November, 1889.

**Republican Party.** 1. The party which elected Jefferson. They opposed a strong central government. They changed their name to Democratic-Republicans, and later to Democrats. 2. The party formed by the fusion of all factions opposed to slavery. This party elected Lincoln in 1860, and with two exceptions (1884, 1892) have won each succeeding presidential election.

**Repudiation**, a refusal on the part of a government to pay the debts contracted by the governments which have preceded it. Repudiation has sometimes been resorted to by the smaller American republics, and in Europe there are also instances of a similar kind.

**Reputed Ownership**, in law, is a phrase used of a person who has to all appearances the right and actual possession of property. When a person becomes bankrupt all goods and chattels that are in his possession with the consent of the true owner, and in such a way that he is reputed owner of them, may in general be claimed by the trustee for the benefit of the creditors.

**Rescue**, in law, the forcible or illegal taking of a person or thing (as a prisoner or a thing lawfully distrained) out of the custody of the law.

**Reserve**, in banking and insurance, that portion of capital which is set aside to meet liabilities, and which, in banking, is therefore not employed in discounts or temporary loans.

**Reservoir** (rez'er-vwâr), an artificial basin in which a large quantity of water is stored. The construction of a reservoir often requires great engineering skill. In the selection of a site the great object should be to choose a position which will give the means for collecting a large supply of rainfall with as little recourse as possible to artificial structures or excavations. The embankments or dams may be constructed either of masonry or earthwork, but the latter

is the more usual, as it is generally the more economical method. Reservoirs in which the dams are built of earthwork must be provided with a waste-weir, to admit of the surplus water flowing over; in the reservoirs of which the dams are built of masonry there is no necessity for a waste-weir, as then the water may be allowed to overflow the wall, there being no fear of its endangering the works. The outlet at the bottom, by which the water to be used is drawn off from the reservoir, may consist either of a tunnel, culvert, or iron pipes provided with suitable sluices.

**Reshd**, a town of Persia, capital of the province of Gilan, 150 mi. n.w. of Teheran, near the Caspian Sea. Reshd is a well built town, and is the center of the silk trade of Persia, and through its port Enzelli, 16 mi. distant, carries on a considerable trade with Russia. Pop. 41,000.

**Residuary Legatee**, in law, the person to whom the surplus of the personal estate, after the discharge of all debts and particular legacies, is left by the testator's will.

**Resins**, a class of vegetable substances insoluble in water, soluble in alcohol, and easily softened or melted by heat. Resins are either neutral or acid; they are transparent or translucent; they have generally a yellow-brown color; are sometimes elastic, but more generally friable and hard. They become electric when rubbed. Resins may be divided into three classes: 1. Those which exude spontaneously from plants, or from incisions in the stems and branches. They are generally mixtures of gum resins and volatile oils. The principal resins belonging to this class are benzoin, dragon's blood, Peru balsam, storax, copaiba, copal, elemi, guaiacum, jalap, lac, myrrh, sandarach, and turpentine. 2. Resins extracted from plants by alcohols; they generally contain definite carbon compounds. The principal resins belonging to this class are gum ammoniacum, angelica root, Indian hemp, cubeb, manna, and squill. 3. Fossil resins, occurring in coal or lignite beds, amber, asphalt, copal, fossil caoutchouc, etc. See *Turpentine*.

**Resolutions of 1798**, adopted by the legislatures of Virginia and Kentucky. The Virginia resolutions declared the U. S. Constitution to be a compact made by the states, and to form which the states had agreed to surrender only a part of their own powers. The federal government could not exceed the authority delegated to it by the states; if it did the states had a right to stop it, and to maintain the powers they had reserved to themselves. These resolutions were drawn up by James Madison. The Kentucky resolutions repeated those of Virginia in substance, and added that the Federal compact was a contract between the states as one party to it and the Federal government the other; and that each party was to be the judge of any breach of the agreement, and of the manner of redress. The Kentucky resolutions were framed by Thomas Jefferson. They were repeated in 1799, with the amendment that the rightful remedy on



## Respiration

the part of a state was "nullification of all unauthorized Federal acts done under color of the Constitution."

**Respiration**, the act of respiring or breathing. Respiration is that great physiological function which is devoted to the purification of the blood by the removal, through the media of the breathing organs, of carbonic acid and other waste products, and at the same time to the revivifying of the blood by the introduction of the oxygen of atmospheric air. It is thus partly excretory and partly nutritive in its character. The other waste products, besides carbonic acid, which are given off in the process of animal respiration are water, ammonia, and organic matters; but carbonic acid is by far the most important.

In man and the higher animals respiration is carried on by the breathing organs or lungs. The blood is conveyed to the breathing organs by special vessels, the right side of the heart in birds and mammals being exclusively employed in driving blood to the lungs for purification. The blood is sent through the pulmonary or lung capillaries in a steady stream, and passes through these minute vessels at a rate sufficient to expose it to the action of the oxygen contained in the air cells of the lung. The essential part of the function of respiration, namely, the exchange of carbonic acid gas for oxygen, thus takes place in the lung, where the dingy-hued venous blood becomes converted into the florid red arterial blood. Respiration includes the physical acts of inspiration and expiration, both involuntary acts, although they may be voluntarily modified. From fourteen to eighteen respiratory acts take place per minute, the average quantity of air inhaled by a healthy adult man being about 30 cu. in., a slightly smaller quantity being exhaled. This definite volume of air which ebbs and flows is termed *tidal air*. The quantity (about 100 cu. in.) which may be taken in a deep inspiration, in addition to the tidal air, is termed *complemental air*. The quantity of air (75 to 100 cu. in.) remaining in the chest after an ordinary expiration has expelled the tidal air, is named *supplemental* or reserve air, and this may be in greater part expelled by a deeper expiration; while a quantity of air, also averaging from 75 to 100 cu. in., always remains in the lungs after the deepest possible expiratory effort, and cannot be got rid of. This latter quantity is therefore appropriately named *residual air*. The difference in the mode of breathing between the two sexes is clearly perceptible. In man it is chiefly *abdominal* in its character; that is to say, the lower part of the chest and sternum, together with the abdominal muscles, participate before the upper portions of the chest in the respiratory movements; while in women the breathing movements are chiefly referable to the upper portions of the chest. In women, therefore, breathing is said to be *pectoral*.

Every volume of inspired air loses from 4 to 5 per cent. of oxygen and gains rather less carbonic acid. The quantity of carbonic acid

## Restitution of Conjugal Rights

given off varies under different circumstances. More carbonic acid is excreted by males than by females of the same age, and by males between eight and forty than in old age or in infancy. An average healthy adult man will excrete more than 8 oz. of carbon in 24 hours. Hence the necessity for repeated currents of fresh air in meeting places and places of public entertainment, in halls and in churches, and for the proper ventilation of sleeping apartments. The breathing of an atmosphere vitiated by organic matter and carbonic acid results in imperfect oxygenation of the blood, is accompanied or followed by headaches, drowsiness, and lassitude, and is the source of many serious and even fatal disorders.

While in man and the more highly organized animals respiration is carried on by the lungs, in fishes it is effected by the gills. The essential feature of any breathing organ is a thin membrane, having the blood on one side and air, or water containing air, on the other; and the essential feature of respiration is an interchange of products between the blood and the atmosphere, oxygen passing from atmosphere into the blood, and carbonic acid and organic matters from the blood into the atmosphere. In the protozoa no respiratory organs are specialized, but the protoplasm of which the bodies of these animals are composed, has doubtless the power of excreting waste matters, as well as of absorbing nutritive material. Even in comparatively high organisms, where no specialized breathing organs are developed, the function of respiration may be carried on by the skin or general body surface, the integument being, as in the highest forms, intimately correlated in its functions to the breathing process. Thus in earthworms, lower crustacea, etc., the breathing appears to be wholly subserved by the body surfaces.

Respiration goes on in plants as well as in animals, the plant in the presence of light exhaling oxygen and inhaling carbonic acid, and thus reversing the action of the animal.

**Respond'ent**, in law, the designation of the party requiring to answer in a suit, particularly in a chancery suit.

**Responsibility for Crime** attaches fully to all above fourteen, if not lunatic. An indefinite measure of responsibility begins to attach at seven, but till fourteen the presumption is in favor of innocence. An infant under seven is held to be incapable of committing crime. Ignorance as to fact, but not ignorance as to law, may remove, or at least lessen, responsibility.

**Restigouche** (res'ti-gösh), a river which separates New Brunswick from the province of Quebec, flowing northeast into the Bay of Chaleurs at Dalhousie. It is 200 mi. long, is navigable for 16 mi. to Campbellton, and forms a tidal estuary for 24 mi. It drains 4,000 sq. mi., and its basin supplies great quantities of timber.

**Restitution of Conjugal Rights**, in law, is where either the husband or the wife, without sufficient reason, lives separate from the

## Resurrection

other, in which case, if either party desires it, the divorce and matrimonial court will compel them to come together again.

**Resurrection**, the rising again of the body from the dead to be reunited to the soul in a new life. It has formed a part of the belief of the Christian church since its first formation, and has been embodied as an article in each of the creeds. Connected with this subject is the resurrection of Christ from the dead, the corner-stone of the Christian system. The evidence in support of it is marked by the following characteristics: 1, *The variety of circumstances* under which the risen Saviour appeared. 2, *The circumstantiality* of the testimony given by the different witnesses. 3, *The simplicity and apparent truthfulness* with which the witnesses describe their impressions when the Saviour appeared to them. 4, *That the event borne witness to was completely unexpected by the witnesses*; and 5, *That the testimony was published to the world on the very spot where, and at the very moment when, the event was said to have happened.* Various attempts have been made to explain away the resurrection of Christ. There is the supposition, 1, of fraud; that, according to the statement of the Jews, the disciples stole the body, and then published the story that their Lord was risen. 2, That Jesus had not really died on the cross; that his apparent death was only a swoon, from which he afterward recovered. 3, That there had been no real resurrection, but that the disciples had been deceived by visionary appearances or hallucinations. 4, That the assertion of the resurrection was originally allegorical. With regard to the significance of Christ's resurrection, it was the crowning evidence of the divine character of his mission.

**Retainer**, in law, the act of a client by which he engages an attorney or counselor to manage a case. The effect of a retainer is to confer on the attorney all the powers exercised by the forms and usages of the court in which the suit is pending. It is *special* when given for the purpose of securing the counsel's services for a particular case; *general*, when for securing his services generally. The retainer is in all cases accompanied by a preliminary fee called a retaining fee.

**Retention**, in law, a lien; the right of withholding a debt, or of retaining property until a debt due to the person claiming this right be duly paid.

**Retiarius**, in Roman antiquities, a gladiator who wore only a short tunic and carried a trident and net, with which he endeavored to entangle and dispatch his adversary, who was armed with helmet, shield, and sword.

**Reticulated Molding**, in architecture, a member enriched with a raised fillet interlaced in various ways like network. It is seen chiefly in buildings in the Norman style.

**Reticulated Work**, a species of masonry very common among the ancients, in which the stones are square and laid lozenge-wise, resembling the meshes of a net, and producing quite an ornamental appearance. It is the *opus reticulatum* of the Romans.

## Revenue Cutter

**Retirement**, in the army and navy, is withdrawal from the service with the retention of all or a portion of the pay. In the U. S. army and navy officers are retired after forty years' service, or at sixty-two years of age, as the case may be, receiving 75 percent. of their annual pay for life.

**Retriever Dog**, a dog specially trained to fetch game which has been shot, and greatly valued by sportsmen for its sagacity in the field and in the water. The larger and more familiar breed of retrievers is formed by crossing the Newfoundland and the setter; the smaller breed is formed by crossing the water spaniel and terrier. The typical retriever is 20 or more in. high, with a stoutly built body, strong limbs, webbed toes, black and curly fur.

**Retrogression of the Moon's Nodes**, the motion of the moon's nodes—the two points in which the moon's orbit meets the plane of the ecliptic—in the direction opposite to that of the sun's motion in the ecliptic. The moon's nodes slowly change at each revolution of the moon, in the direction from left to right, and make a complete revolution round the earth in 18.6 years.

**Return**, in law, the sending back of a writ or other process to the court from which it issued by the officer to whom it was addressed, with a written account of what he has done in executing the process, to be filed in the office of the clerk of the court.

**Réunion** (râ-û-ni-ôn) (formerly Bourbon), an island in the Indian Ocean, between Mauritius and Madagascar, 115 mi. from each; area 1,127 sq. mi. It is very mountainous, the Piton des Neiges reaching a height of 10,069 ft. and the Piton de la Fournaise, an active volcano, of 8,294 ft. The soil produces tropical products, sugar being the principal crop. Coffee, cloves, and vanilla are also grown. Destructive hurricanes are frequent. The population, which consists of creoles, negroes, Indian coolies, Chinese, Malays, etc., is 179,639.

**Reus** (râ-us'), a city of Spain, in Catalonia, in the province and 10 mi. w. of Tarragona, in a plain at the base of a chain of hills, about 4 mi. from the port of Salou on the Mediterranean. Reus is now, next to Barcelona, the most flourishing manufacturing town of Catalonia, the staples being silk and cotton. Imitation French wines are largely made. Pop. 27,595.

**Reval** (or Revel), a fortified seaport of Russia, capital of Esthonia, on a small bay in the Gulf of Finland. It contains several ancient churches, a fine modern church, a cathedral, and many interesting antiquities. Its manufactures are unimportant, but its trade is large, the exports being chiefly grain, flax, and spirits, and the imports, coal, iron, cotton, tea, wine, and chemicals. Pop. 51,277.

**Revenue**, the income of a nation derived from taxes, duties, and other sources, for public uses.

**Revenue Cutter**, a sharp-built, single-masted vessel, armed for the purpose of preventing smuggling and enforcing the customhouse regulations.

## Revere

**Revere** (re-vēr'), PAUL (1735-1818), b. at Boston, Mass.; earned fame by riding through Charlestown to Concord on the night of April 18, 1775, to give warning of the British expedition, which was resisted next day at Lexington and Concord; a service immortalized in Longfellow's poem, *The Midnight Ride of Paul Revere*. He erected works for rolling copper at Canton, Mass., still carried on by his successors.

**Revere**, Suffolk co., Mass., on Atlantic Ocean and Chelsea River, 5 mi. n.e. of Boston. Railroads: Boston & Maine; B. R. B. & L.; Lynn & Boston Electric. Largely a residence town, a suburb of Boston. Pop. 1900, 10,395.

**Reversion**, in law, the residue of an estate left in the grantor, to commence in possession after the determination of the particular estate granted by him. The estate returns to the grantor or his heirs after the grant is over. In insurance business a reversion is an annuity or other benefit, the enjoyment of which begins after a certain number of years, or after some specified event, as a death or birth.

**Revival**, a term popularly used among Protestants to denote periods of extensive spiritual awakening in a church or community, when professed Christians renew their vows and other persons for the first time openly confess their faith. The term revival is more rarely applied to various important religious movements of the past, like those of monastic orders in some periods of their history, or of the Crusaders or the Wycliffites in England and the Hussites in Bohemia.

As early as the sixteenth century there were Protestant revivals in Scotland under Wishart, Cooper and Welsh, and again both there and in Ireland about a generation later under Bruce and Livingston; but such revivals have flourished most in England and America. The first great revival in England occurred under the preaching of John Wesley and George Whitefield, early in the eighteenth century. In 1739 Whitefield came to America. Previous to his coming, under the vigorous preaching of Jonathan Edwards at Northampton, a revival had spread throughout a large part of New England. Whitefield, a preacher of singular power and inexhaustible energy, followed up the work of Edwards, preaching in the open air to great audiences and winning many hundreds of converts. This revival movement, known as the "Great Awakening," occupied the years 1740 to 1742, and extended throughout almost all the colonies. As one result of the awakening between 1740 and 1760, 150 new churches were established in New England. A new interest in education also resulted and the outcome was the founding of Princeton and Dartmouth colleges. Toward the end of the eighteenth century a fresh series of revivals began, spreading under the itinerant preachers to the new Western settlements. Among the prominent leaders was Charles G. Finney. A feature inaugurated in the South about 1800 was the camp meeting, a great open-air assembly lasting for days or weeks and characterized by religious services every evening and the greater part of the day. The

## Revolver

Chautauqua assembly, a highly successful educational enterprise, is a development of the camp meeting idea. One of the most remarkable of all religious revivals swept over the whole country from 1858 to 1859. The latest series of great revivals occurred in 1875 to 1876, under the preaching and singing of Moody and Sankey, the most renowned evangelists of the nineteenth century.

Catholics employ what they designate as missions to perpetuate religious fervor. These missions are almost wholly conducted by the regular Orders of the church, such as the Jesuits, Franciscans, Dominicans and Paulists. To such work the ablest and most eloquent of the Order are assigned. The missions are invariably conducted in churches. The ordinary term in each parish is two weeks, one of which is devoted to men and the other to women. They are characterized by morning and evening devotions and lectures, and prior to their close the attendants receive the sacraments of penance and the eucharist. These missions are supposed to renew activity in spiritual exercise and may not unjustly be regarded as revivals.

**Revocation**, in law, the destroying or annulling of a deed or will which had existence till the act of revocation made it void. The revocation of a deed can only be effected when an express stipulation has been made in the deed itself reserving this power. The revocation of a will can be made in four different ways: 1, by another will; 2, by intentional burning, or the like; 3, by the disposition of the property by the testator in his lifetime; 4, by marriage.

**Revolution**, any extensive change in the constitution of a country suddenly brought about. The most important events in modern history specifically known under this name are the English revolution of 1689 (Guizot by "Revolution" means the "Great Rebellion"); the American Revolution of 1776; the French Revolution of 1789; the revolution of 1830 ("the July revolution"), which deposed Charles X and raised Louis Philippe to power; the revolution of 1848 ("the revolution of February"), which established the second republic; and the revolutions by which the existing South American republics (including that of Brazil in 1890, and of Chile in 1891) were established or are from time to time modified. The revolutionary period *par excellence* is the years 1848 and 1849. The French change of constitution in 1871 is not usually spoken of as a revolution, though in effect it was one.

**Revolver**, a description of firearm in which a number of charges contained in a revolving cylinder are, by pulling the trigger, brought successively into position and fired through a single barrel. For the revolver in its present form we are indebted to Col. Samuel Colt, though repeating pistols had long been known. These were made from one mass of metal bored into the requisite number of barrels, but were so clumsy as to be almost quite useless. In Colt's weapon there is a revolving cylinder containing six chambers placed at the base of the barrel, each chamber having at its rear



## Reynolds

end a nipple for a cap. These contain the cartridges, which are put in from the front of the breech-piece and driven home by a lever ramrod placed in a socket beneath the barrel. The revolver is fired through the single barrel, the cylinder being turned by mechanism connected with the lock, until each chamber in succession is brought round so as to form virtually a continuation of the barrel. Various modifications of Colt's revolver have been introduced, with the view in some cases of increasing the rapidity and facility of firing, in others of diminishing by safeguards the risks to which inexperienced hands must ever be exposed in the use of these weapons. In the Smith and Wesson revolver, one of the most recent, facility in loading is a feature, the cylinder and barrel together being pivoted to the front of the stock, so that by setting the hammer at half-cock, raising a spring-catch, and lowering the muzzle, the bottom of the cylinder is turned up to receive fresh metallic cartridges. When this is done the muzzle is pressed back until the snap-catch fastens it to the back plate, and the revolver is again ready to be fired. In the latest form of this revolver the spent cartridges are thrown out of the cylinder by means of an automatic discharger. As a military weapon the revolver will, it is thought, be superseded by a repeating pistol with mechanism similar to that of magazine rifles. The revolver principle has also been applied to rifles, and to guns for throwing small projectiles, as in the Gatling and other machine guns.

**Reynolds, Sir Joshua** (1723-1792), English portrait painter, was b. at Plympton, Devonshire. Through the kindness of Captain (afterward Admiral) Keppel, he was enabled to visit Italy, where he studied three years. Returning to London in 1753, and finding generous patrons in Admiral Keppel and Lord Edgcumbe, his studio was thronged with the wealth and fashion of the metropolis, and the most famous men and the fairest women of the time were among his sitters, so that he rapidly acquired opulence, and was the acknowledged head of his profession. Among the more notable of his portraits are the Duchess of Hamilton, the Duke of Cumberland, Miss Palmer, Mrs. Nesbit as Circe, Mrs. Siddons as the Tragic Muse, the Duchess of Devonshire and child, and Miss Gwatkin as Simplicity. In 1768, on the foundation of the Royal Academy, he was chosen president, and received the honor of knighthood; and in 1784 he was appointed principal portrait painter to the king. As president of the Royal Academy he delivered his celebrated annual *Discourses on Painting*, the last of which was delivered in 1790. He was the intimate friend of Dr. Johnson, Goldsmith, Garrick, Burke, and other literary celebrities, with whom he was associated in founding the "Literary Club" in 1764. His portraits are distinguished by dignity and grace, and above all by a peculiar power of color which he had caught in Italy from the great Venetian masters. Apart from portraiture the other pictures which may be

## Rheims

mentioned are his *Death of Cardinal Beaufort*, *Macbeth*, *Puck*, and several *Holy Families* and *Nativities*. He died unmarried, and was interred in St. Paul's Cathedral.

**Rhadaman'thus**, in Greek mythology, a son of Zeus and Europa, and brother of Minos, king of Crete, whom he assisted in his sovereignty, and whose jealousy he aroused by his inflexible integrity, which earned for him the admiration of the Cretans. Rhadamanthus then fled to Bœotia, where he married Alcmena. After his death he became, on account of his supreme justice, one of the three judges of the lower world.

**Rhæ'tia**, a province of the Roman Empire, which included great part of the Alpine regions between the valleys of the Danube and the Po, and corresponded with the districts occupied in modern times by the Austrian province of Tyrol and the Swiss canton of Grisons. The Rhætians, who are generally supposed to have been of Etruscan origin, were subdued by Drusus and Tiberius, 15 B.C.; and shortly afterward Rhætia was incorporated as a province in the Roman Empire. During the last days of the Roman Empire, when the barbarians devastated the provinces, Rhætia was nearly depopulated; and after the fall of the Roman empire it was occupied by the Alemanni and Suevi.

**Rhea**, in Greek mythology, the daughter of Uranos and Gæ (Heaven and Earth), sister and wife of Cronos (Saturn), and mother of Hestia (Vesta), Dēmētēr (Ceres), Hera (Juno), Hades (Pluto), Poseidon (Neptune), and Zeus (Jupiter). She was the symbol of the reproductive power of nature, and received the appellation of "Mother of the Gods," and "Great Mother," being latterly identified with Cybele.

**Rhea**, the generic name of the nandu or South American ostrich, a close ally to the true ostrich, differing chiefly in having three-toed feet and each toe armed with a claw. The best known species is *R. americana*, the *nandu*, or *nanduguacu* of the Brazilians, inhabiting the great South American pampas. It is considerably smaller than the true ostrich, and its plumage is much inferior. *R. Darwinii*, a native of Patagonia, is still smaller. The third species is the *R. macrorhyncha*, so called from its long bill.

**Rheims** (or Reims) (rēmz), a town of France, in the department of Marne, in an extensive basin surrounded by vine-clad hills, 82 mi. e.n.e. of Paris. The principal edifices are the cathedral; the archiepiscopal palace; the church of St. Remy; the Porte de Mars; the townhouse, etc. The staple industries are the manufacture of the wine known as champagne, and of woolen fabrics, such as flannels, merinoes, blankets, etc. Rheims was an important place in the time of Cæsar, the capital of the Remi, and subsequently of Belgic Gaul. Here St. Remy converted and baptized Clovis and almost all the Frankish chiefs in 496. It was made the seat of an archbishop in the eighth century, and from the time of Philip Augustus (1179) to that of Charles X the kings of France were crowned here. It has suffered

## Rhenish Prussia

much from war, and was at one time in possession of the English, who were expelled by the Maid of Orleans in 1429. It was held by the Germans in 1870-71. Pop. 104,186.

**Rhenish Prussia**, the most westerly province of Prussia, touching west and north Luxemburg, Belgium, and Holland; area 10,420 sq. mi.; greatest length from north to south about 200 mi., greatest breadth about 90. In the south it is hilly, being traversed by the ranges of the Eifel, Hochwald, etc. It is watered by the Rhine, the Moselle, and some affluents of the Meuse. A large proportion of the surface is in forest. Besides the usual cereal crops, tobacco, hops, flax, rape, hemp, and beet-root are raised; fruit culture and the vine culture are also carefully attended to. Cattle are extensively reared. It is the most important mineral district in Germany, abounding in coal, iron, lead, zinc, etc. It is likewise an active manufacturing district, there being numerous iron-works and machine-shops, textile factories, breweries, distilleries, etc. It is divided into the five governments or districts of Coblenz, Treves, Cologne, Aachen, and Düsseldorf. The city of Coblenz is the official capital of the province, but Cologne is the town of most importance. Pop. 4,344,527.

**Rhenish Wines**, the general designation for the wines produced in the region watered by the Rhine, and specifically for those of the Rheingau, the white wines of which are the finest in the world. The red wines are not so much esteemed, being considered inferior to those of Bordeaux. Good wines are also produced in the valleys of the Neckar, Moselle, and other tributaries of the Rhine. The vineyards are mainly between Mannheim and Bonn, and the most valuable brands of wines are those of Johannisberg, Steinberg, Hochheim, Rüdesheim, Rauenthal, Markobrunn, and Asmannshausen, the last being a red wine.

**Rhet'oric**, in its widest sense, may be regarded as the theory of eloquence, whether spoken or written, and treats of the general rules of prose style, in view of the end to be served by the composition. In a narrower sense rhetoric is the art of persuasive speaking, or the art of the orator, which teaches the composition and delivery of discourses intended to move the feelings or sway the will of others. In the wider sense rhetoric treats of prose composition in general, purity of style, structure of sentences, figures of speech, etc.; in short, of whatever relates to clearness, preciseness, elegance, and strength of expression. In the narrower sense it treats of the invention and disposition of the matter, the character of the style, the delivery or pronunciation, etc. Aristotle, Cicero, and Quintilian are the principal writers on rhetoric among the ancients.

**Rhigas**, CONSTANTINE (1753-1798), Greek poet, the Tyrtæus of modern Greece, the first mover of the war for Grecian independence. He formed the bold plan of freeing Greece from the Porte by means of a great secret association, and composed in his native language a number of patriotic songs, calculated to inflame the imagination of the Greek youth and

## Rhinoceros

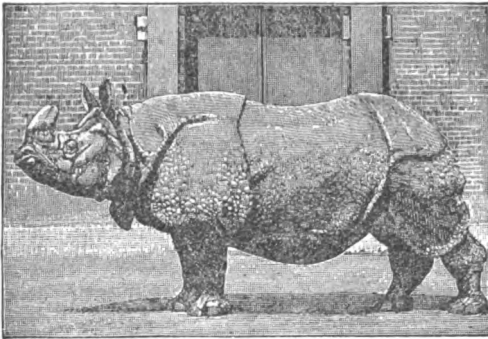
embitter them against the Mussulmans. He was arrested and put to death by the Turkish authorities at Belgrade. During the Greek war of independence, which ultimately led to the emancipation of their country from the Turkish yoke, his songs were in the mouth of every one.

**Rhine**, the finest river of Germany, and one of the most important rivers of Europe, its direct course being 460 mi. and its indirect course 800 mi.; while the area of its basin is 75,000 sq. mi. It is formed in the Swiss canton Grisons by two main streams called the Vorder and Hinter Rhein. The Vorder Rhein rises in the Lake of Toma, on the s.e. slope of the St. Gothard, at a height of 7,690 ft. above the sea, near the source of the Rhone, and at Reichenau unites with the Hinter Rhein, which issues from the Rheinwald Glacier, 7,270 ft. above sea level. Beyond Reichenau, which is 7 mi. west of Coire, the united streams take the common name of Rhine. From Coire the Rhine flows north through the Lake of Constance to the town of that name, between which and Bâle it flows west, forming the boundary between Switzerland and Germany. At Bâle it turns once more to the north and enters Germany; and, generally speaking, it pursues a northerly course until it enters Holland, below Emmerich, when it divides into a number of separate branches, forming a great delta, and falling into the sea by many mouths. In the German part of its course the chief tributaries it receives on the left are the Ill, Nahe, Moselle, Ahr, and Erft; and on the right the Neckar, Main, Lahn, Sieg, Ruhr, and Lippe. In Switzerland its tributaries are short and unimportant, and this part of its course is marked by the falls of the Rhine at Shaffhausen. The chief towns on its banks are Constance and Bâle in Switzerland; Spire, Mannheim, Mainz, Coblenz, Bonn, Cologne, and Düsseldorf, with Worms and Strasburg not far distant, in Germany; Arnheim, Utrecht, and Leyden in Holland. It abounds with fish, especially pike, carp, and other white fish, but the produce of its salmon fisheries has been seriously interfered with since the introduction of steam vessels. It is navigable without interruption from Bâle to its mouth, a distance of 550 mi., and much timber in rafts, coal, iron, and agricultural produce are conveyed by it. Large sums are spent every year in keeping the channel in order, and in the erection or repair of river harbors, both in Germany and Holland. The Rhine is distinguished for the beauty of its scenery, which attracts many tourists. For a large part of its course it has hills on both sides at less or greater distances. Pleasant towns and villages lie nestled at the foot; above them rise rocky steep slopes clothed at one time with vines, at others with natural wood, and every now and then the castles and fastnesses of feudal times are seen frowning from precipices apparently inaccessible. The finest part for scenery is between Bingen and Bonn; after entering Holland the views are generally tame and uninteresting.

**Rhinoceros**, a genus of hoofed mammals,

## Rhio

allied to the elephant, hippopotamus, tapir, etc. They are large ungainly animals, having short legs, and a very thick skin, which is usually thrown into deep folds. There are seven molars on each side of each jaw; there are no canines, but there are usually incisor teeth in both jaws. The feet are furnished with three toes each, encased in hoofs. The nasal bones usually support one or two horns, which are of the nature of epidermic growths, somewhat analogous to hairs. When two horns are present the one is placed behind the other and is generally shorter than it. These animals live in marshy places, and subsist chiefly on grasses and foliage. They are exclusively confined to the warmer parts of the eastern hemisphere. The most familiar species is the one-horned or Indian rhinoceros, which, like all the Asiatic species, has the skin thrown into very definite folds, corresponding to the regions



Rhinoceros.

of the body. The horn is black, and usually very thick. The upper lip is very large, and is employed by the animal somewhat as the elephant uses his trunk. Though possessed of great strength it is quiet and inoffensive unless provoked. The Javanese rhinoceros is distinguished from the Indian chiefly by its smaller size. It has been trained to bear a saddle and to be driven. It occurs in Java, Sumatra, and Borneo. The Sumatran species is found in Sumatra and the Malay Peninsula. It has two horns, the first being the longer and sharper. The typical African rhinoceros is found in Southern Africa generally. Like other African species it possesses no skin-folds. The horns are of very characteristic conformation, the front horn being broad and raised as on a base, sharp pointed, and curved slightly backward while the hinder horn is short and conical. This animal appears to be of ferocious disposition, is quick and active, and greatly feared by the natives. Other allied African species are the Keitloa or Sloan's rhinoceros, the common white rhinoceros, and the long-horned white rhinoceros. Fossil species are numerous, and range from the Miocene tertiary through the Pliocene and Post-Pliocene deposits.

**Rhio** (or Riouw) (ri-ou'), a seaport belonging to the Dutch, in the Indian Archipelago, on an islet 50 mi. s.e. of Singapore. It consists of a European town, and a Chinese or native

## Rhode Island

town, and having a capacious haven where large vessels find anchorage, carries on a considerable trade. It is the capital of a Dutch residency, comprising the islands of the Rhio Archipelago and other groups as well as districts on the east coast of Sumatra. The population of the residency is estimated at 90,000. The Rhio Archipelago is a group of small islands lying chiefly south and east of Singapore. Chief island Bintang.

**Rhizopoda**, the lowest class of the Protozoa, comprehending animals which are destitute of a mouth, are single or compound, and possess the power of emitting pseudopodia. They are mostly minute, frequently microscopic, but some (such as the sponges) attain considerable size. Structurally the rhizopods consist of a mass of sarcode, destitute of organs for digestion, etc. The characteristic from which they have their name is their capability of protruding processes (pseudopodia) from any part of their substance, sometimes as filaments or threads and sometimes finger-shaped, and retracting them at pleasure. Some, as the Foraminifera, are invested with a calcareous shell, sometimes consisting of one cell, but generally of an aggregation of minute chambers or cells, through the pores of which they protrude their fiber-like processes. The class has been divided into five orders—Monera, Amœbea, Foraminifera, Radiolaria, and Spongida, of which the last is occasionally considered a separate class. See separate entries.

**Rhode Island**, one of the original thirteen states and the smallest in the Union, is bounded on the n. and e. by Massachusetts, on the s. by the Atlantic Ocean, and on the w. by Connecticut. Its length from north to south is not quite 50 mi., and its width is about 40 mi.; land area 1,085 sq. mi. There are no mountains in the state, but the surface is considerably diversified. The northern and eastern sections are hilly, and the land slopes toward a level region in the south. The coast along the Atlantic Ocean measures about 45 mi., but Narragansett Bay, which penetrates inland some 30 mi., affords with its various inlets about 350 mi. of shore washed by tidewater. The southern coast west of Point Judith is low and sandy. To the west the shores are formed by high rocky cliffs interspersed with beaches of sand. Rhode Island is drained chiefly by the Pawtucket, Pawtuxet, and Pawcatuck rivers, all navigable for short distances and affording excellent water power.

**Climate.**—The climate is nearly like that of adjoining states, being modified by Narragansett Bay, and the summer season is delightful, particularly in Newport where the mean temperature is 46 degrees. The average rainfall is 40 in. in the east and 44 in the west.

**Vegetation.**—No portion of the state can be described as exceptionally fertile, and only a very small percentage of the population are engaged in agriculture. Market gardening, however, is an important occupation in certain localities. Corn, rye, oats, barley, potatoes, and hay are produced to some extent.

**Mining.**—The geological formation of the



## Rhode Island

Western portion of the state is chiefly that of the Montalban gneiss, which characterizes a great part of southern New England, but under the bay and to the east of it is an extensive coal bearing formation. Other economic properties are iron ore, limestone, sandstone, serpentine, marble, granite, and brick clay.

**Manufactures.**—There has been a steady growth in manufacturing interests in Rhode Island since 1850. The textile industries are the most important in the state, with a product in 1900 valued at \$78,133,258. In the manufacture of cotton goods it is surpassed only by Massachusetts. It ranks third among the wool-manufacturing states, but the production of the latter goods is decreasing and that of worsted goods is increasing very rapidly, the increase in the value of the latter product since 1890 being \$11,021,645. In dyeing and finishing textiles, Rhode Island is third in the Union. In the manufacture of jewelry, the city of Providence ranks first in the U. S., the product in 1900 being valued at \$13,320,620. Other industries are the manufacture of files, of rubber and elastic goods, malt liquors and of electrical apparatus and supplies. Bristol is famous for its yacht-building. Fishing is an important industry along the coast.

**Transportation.**—The state has ample railroad facilities. The principal road is the New York, New Haven & Hartford, which has in the state a mileage of about 200. There are also numerous electric lines, many of which are inter-urban, connecting the cities of Rhode Island and running into Massachusetts and Connecticut. Various steamship lines connect Providence with the other towns upon the bay and with New York, Philadelphia, Norfolk and Baltimore.

**Education.**—Rhode Island has a good system of public schools, with excellent high schools in Providence, Pawtucket and Bristol. The principal institutions for higher education are Brown University, the Rhode Island School of Design and the State Normal school at Providence; and the Rhode Island College of Agriculture and Mechanic Arts at Kingston, with an agricultural experiment farm. The state also has important historical libraries and societies.

**History.**—The Northmen are supposed to have visited Rhode Island in the tenth century, and the "Old Stone Mill" at Newport has been claimed as their work. The founder of the colony was Roger Williams. In 1635, he was banished from the Massachusetts Bay Colony and fled to the Narragansett country, where in 1636 he founded Providence. Two years later the followers of Anne Hutchinson founded Portsmouth. In 1639, Newport was settled, and in 1642, Warwick. In 1644, a charter was granted by which the settlements were united in one colony, with a popular government. This charter was revoked and in 1663, a new one was granted which was remarkably liberal. Rhode Island was governed under this charter 172 years. The colony suffered severely from King Philip's War. With its privateers, Rhode Island took a con-

## Rhone

spicuous part in all the wars waged upon the ocean in which Great Britain was engaged. In the War of 1812, Commodore Perry made the naval renown of the state immortal in the battle of Lake Erie. The colony first suggested to Congress the establishment of a navy. Rhode Island contributed largely of men and money to the Revolutionary armies. Its most eminent soldier was Gen. Nathaniel Greene. Rhode Island was the last of the thirteen colonies to enter the Union, ratifying the Constitution May 29, 1790. The population of the state in 1900, was 428,556, of which 9,506 were negroes. The principal cities, with their population in 1900, are: Providence, the capital, 175,597; Pawtucket, 39,231; Woonsocket, 28,204; Newport, 22,034; and Warwick, 21,316.

**Rhodes**, CECIL J., South African statesman, was b. July 5, 1853, the fourth son of the vicar of Bishop-Stortford in Hertfordshire, and after attending the local grammar school was sent for his health to Natal, where his brother was a planter. He subsequently went to the Kimberley diamond diggings; there he soon became conspicuous and amassed a fortune. He went back to England and entered at Oriel College, Oxford, and though his residence was cut short by ill-health, he ultimately took his degree. He entered the Cape House of Assembly as member for Barkly. In 1884 General Gordon asked him to go with him to Khartoum as secretary; but Rhodes had just taken office in the Cape ministry, and decided to remain in South Africa. He sent \$50,000 to Mr. Parnell to forward the cause of Irish Home Rule. In 1890 he became prime minister of Cape Colony; but even before this he had become a ruling spirit in the recent extension of British territory, and in securing the charter for the British North African Company. His policy may be described as the ultimate establishment of a federal South African dominion under the British flag, and the tactful reconciliation of race prejudices, especially between those of Dutch and English blood. He was implicated in the Jameson raid. D. Mar. 26, 1902.

**Rhodes** (rōdz), an island in the Ægean Sea, belonging to Turkey, off the southwest coast of Asia Minor, from which it is separated by a channel 10 mi. broad; area 424 sq. mi. It is famous for its prolonged defense by the Knights of St. John from 1309 till 1522, when they were forced to abandon the island to the Turks, with whom it has remained ever since.

**Rhône** (rōn), a river in Europe which rises in Switzerland, near the east frontiers of the canton of Valais, about 18 mi. w.s.w. of the source of the Vorder-Rhein. Its precise origin is the Rhône Glacier, 5,581 ft. above the level of the sea. It passes through the Lake of Geneva, and enters France, flowing first southward and then westward to the city of Lyons, where it turns almost due south, and so continues till it falls into the Gulf of Lyons by a greater and smaller mouth, forming here an extensive delta. Its principal affluent is the Saône, which enters it at the city of Lyons; other large tributaries are the Isère and Durance. Its whole course is about 500 mi.; its

## Rhubarb

drainage area is 38,000 m.; and it is navigable for 800 m. By means of a series of magnificent canals the navigation of the Rhone has been continued without interruption to the Rhine, Seine, and Loire, and to the Meuse and the Belgian system.

**Rhubarb**, a genus of herbaceous plants, natives of a considerable portion of Central Asia, with strong, branching, almost fleshy roots and erect, branching stems 6 to 8 ft. high. They usually possess more or less purgative and astringent properties; this is essentially the case with their roots, and hence these are largely used in medicine. At present most of the Asiatic rhubarb comes from China. The



Rhubarb.

leafstalks are now largely used for tarts, puddings, jam, etc., and the juice is made into a kind of wine.

**Rhyme**, in poetry, a correspondence in sound of the terminating word or syllable of one line of poetry with the terminating word or syllable of another. To constitute this correspondence in single words or in syllables it is necessary that the vowel and the final consonantal sound (if any) should be the same, or have nearly the same sound, the initial consonants being different. English writers have allowed themselves certain licenses, and we find in the best English poets rhymes which strike an accurate ear as incorrect, such as *sky* and *liberty*, *hand* and *command*, *gone* and *alone*. Such rhymes may be tolerated if they only occur at rare intervals, but they must certainly be regarded as blemishes. If the rhyme is only in the last syllables, as in *forgave* and *behave*, it is called a *single rhyme*; if in the two last syllables, as *bitter* and *glitter*, it is called a *double rhyme*; if in the last three syllables, as *callosity* and *reciprocity*, it is called a *triple rhyme*. This last sort of rhymes is principally used in pieces of a comic or conversational character. Rhymes which extend to more than three syllables are almost confined to the Arabians and Persians in their short odes in which the same rhyme, carried through the whole poem, extends sometimes to four and more syllables. The modern use of rhyme was not known to the Greeks and

## Ribbon Fishes

Romans, though some rhymed verses occur in *Ovid*. It has been used, on the other hand, from time immemorial among the Chinese, Hindus, Arabs, and other Oriental nations. Rhyme began to be developed among Western nations in the Latin poetry of the Christian church. It is found used as early as the fourth century. The early English, German, and Scandinavian poems are distinguished by alliteration instead of rhyme. The Troubadours first attempted a variety of artificial combinations of rhyme in the sonnet, canzone, etc., and the Spaniards and Italians, with their musical languages and delicacy of ear perfected the forms of involved rhyme.

**Rhythm**, in general, means a measured succession of divisions or intervals in written composition, music, or dancing. The rhythm of poetry is the regular succession of accent, emphasis, or voice stress; or a certain succession of long and short (heavy and light) syllables in a verse. Prose also has its rhythm, and the only difference (so far as sound is concerned) between verse and prose is, that the former consists of a regular succession of similar cadences, or of a limited variety of cadences, divided by grammatical pauses and emphases into proportional clauses, so as to present sensible responses to the ear at regular proportioned distances. In music, rhythm is the disposition of the notes of a composition in respect of time and measure; the measured beat which marks the character and expression of the music.

**Riazan** (or Ryazan) (ryá-zán'), capital of a government of the same name in Central Russia. The town is situated on the Trubesh, a tributary of the Oka, in the center of a rich agricultural district, and has a large trade, more especially in rye. Manufactures include woollens, linens, needles, and leather. Pop. 30,375. The government has an area of 16,254 sq. mi., and is wholly drained by the Oka and its tributaries. The surface on the right of the Oka is largely swampy and has extensive forests; on the left it is generally fertile. Cereals of all kinds are produced for export. The principal manufactures are cotton, linen, leather, and spirits. Pop. 1,783,958.

**Rib**, in architecture, a term applied variously, as for instance to an arch-formed piece of timber for supporting the lath and plaster work of a roof; a plain or ornamented molding on the interior of a vaulted roof; to the moldings of timber roofs, and those forming tracery on walls and in windows.

**Ribbon Fishes**, the name of certain deep-sea fishes met with in all parts of the ocean, generally found floating dead on the surface, or thrown ashore by the waves. The body is like a band from 15 to 20 ft. long, 10 to 12 in. broad, and an inch or two thick. These fishes are generally silvery in color. They live at such a depth that when they reach the surface the expansion of gases in the body so loosens all parts of the muscular and bony system that some portions are nearly always broken on lifting them out of the water. The fin rays in younger ribbon fishes are extraordinarily

developed, some of them being several times longer than the body. The dead fish is often met with in the North Atlantic, and is sometimes found after gales on the Scottish coasts.

**Ribot, ALEXANDER FELIX JOSEPH**, b. at St. Omar in 1842. He received a law education in Paris and in 1875 was appointed director of criminal affairs and pardons. He became a member of the Chamber in 1878, was re-elected in 1881 and again in 1887. He held the Portfolio of foreign affairs in 1890, and became president of the cabinet in 1893 and minister of the interior. In 1895 President Faure appointed him premier.

**Ricar'do, DAVID** (1772-1823), a celebrated writer on finance and political economy, was the son of a Jewish stockbroker, and was b. in London. In 1793 he embraced Christianity and married a Christian wife. He then began business as a stockbroker on his own account, and in a short time realized an immense fortune. His first publication was on the subject of the depreciation of the national currency (1810). He then published an *Essay on Rent*, and his name is usually associated with a certain distinctive view on this subject. See *Rent*. In 1816 he wrote a pamphlet entitled *Proposals for an Economical and Secure Currency*. But his most important work is his *Treatise on Political Economy and Taxation*, which appeared in 1817. In 1819 he entered Parliament as a member for Portarlington. In 1822 he published a pamphlet on *Protection to Agriculture*. Though his mode of treatment is totally different, he belongs essentially to the school of Adam Smith.



Rice. *b.*—panicle in seed; somewhat resembling *c.*—flower; *d.*—seed.

that of the oat; the seeds are white and oblong, but vary in size and form in the numerous varieties. In the cultivation of this plant a high summer temperature is required, combined with abundance of water. Thus the seaboard areas and river deltas which are subject to inundation give the best conditions, otherwise irrigation is necessary. The amount of water required by

the plant depends upon its strength and stage of growth. In the U. S. it is grown chiefly in the swampy districts of South Carolina, Georgia, and Louisiana. In the husk rice is known by the name of "paddy." Rice is more largely consumed by the inhabitants of the world than any other grain; but it contains less flesh-forming matter, only 6.5%. See colored plate, *Grains—Wheat*.

**Rice Bunting**, a name given to two distinct birds. The first, also known by the name "bobo'link," a bird of the bunting family, which migrates over North America from Labrador to Mexico, appearing in Massachusetts about the beginning of May. Their food is insects, worms, and seeds, including rice in South Carolina. The song of the male is singular and pleasant. The other species, known as the rice bunting, is the Java sparrow and paddy bird. It belongs to the true finches, a group nearly allied to the buntings. It possesses a largely developed bill; the head and tail are black, the belly rosy, the cheeks of the male white, and the legs flesh-colored.

**Rice Paper**, a substance prepared from thin, uniform slices of the snow-white pith of *Aralia papyrifera* which grows in Formosa. Rice paper is prepared in China, and is used in the manufacture of artificial flowers and by native artists for water-color drawings.

**Richard I** (1157-1199), king of England, surnamed Cœur de Lion, second son of Henry II by Eleanor of Aquitaine, was b. at Oxford. He several times rebelled against his father, and in 1189, supported by the king of France, he defeated the forces of Henry, who was compelled to acknowledge Richard as his heir. On Henry's death at Chinon, Richard sailed to England and was crowned at Westminster in 1189. The principal events of his reign are connected with the third Crusade, in which he took part, uniting his forces with those of Philip of France.

**Richard II** (1366-1400), king of England, son of Edward the Black Prince, and grandson of Edward III, was b. at Bordeaux. He succeeded the latter in 1377. In 1381 took place the insurrection headed by Wat Tyler, in the suppression of which the boy king showed considerable capacity and boldness, but his after life did not correspond with this early promise. In his sixteenth year (1382) he married Anne, daughter of the Emperor Charles IV. Wars with France and Scotland, and the ambitious intrigues of the Duke of Lancaster, one of his uncles, disquieted some succeeding years. In 1394 Anne of Bohemia died, and two years later Richard married Isabella of France. A quarrel having broken out between Richard's cousin, the Duke of Hereford, son of John of Gaunt, and the Duke of Norfolk, Richard banished them both. The next year, 1399, the Duke of Lancaster died, and Richard confiscated his estates. This unjust act was the immediate cause of the king's fall. During his absence in Ireland, Bolingbroke, as the Duke of Hereford was called, landed in Yorkshire with a small force, and the king on his return to England was solemnly deposed by



### Richard III

Parliament, 1399, and the crown was awarded to Henry. Richard was imprisoned in the castle of Pomfret, where he is supposed to have been murdered.

**Richard III** (1450-1485), king of England, the last of the Plantagenet kings, b. at Fotheringhay Castle, was the youngest son of Richard, duke of York, who was killed at Wakefield. On the accession of his brother, Edward IV, he was created Duke of Gloucester, and during the early part of Edward's reign served him with great courage and fidelity. He married in 1473 Anne of Neville, joint heiress of the Earl of Warwick, whose other daughter was united to the Duke of Clarence, and quarrels rose between the two brothers over their wives' inheritance. On the death of Edward in 1483, the Duke of Gloucester was appointed protector of the kingdom; and he immediately caused his nephew, the young Edward V, to be declared king, and took an oath of fealty to him. But Richard soon began to pursue his own ambitious schemes. Earl Rivers, the queen's brother, and Sir R. Grey, a son by her first husband, were arrested and beheaded at Pomfret, and Lord Hastings, who adhered to his young sovereign, was executed without trial in the Tower. It was now asserted that the king and his brother were illegitimate, and that Richard had a legal title to the crown. The Duke of Buckingham supported Richard, and a body of peers and citizens having offered him the crown in the name of the nation he accepted it, 1483, and was crowned at Westminster.

**Richardson, HENRY H.**, American architect (1838-1886), b. in Louisiana. He graduated from Harvard at the age of 21, and went to Paris, where he remained until 1865 studying architecture. He became prominent as an architect of Brattle St. Church, Boston, and he spent about six years on Trinity Church in the same city. He was employed on the New York State Capitol for several years. His work has much individuality.

**Richardson, SAMUEL** (1689-1761), English novelist, was b. in Derbyshire. When he was nearly fifty he was asked by two booksellers to compose a "familiar letter writer." In doing this he threw the letters into the form of a story, which he published under the title of *Pamela or Virtue Rewarded*. So great was its popularity that it ran through five editions in one year. In 1749 the appearance of a second novel, *Clarissa Harlowe*, fully established his literary reputation. The *History of Sir Charles Grandison* appeared in 1753, and was also received with great applause. In 1754 Richardson became master of the Stationers' Company, and in 1760 purchased a moiety of the patent of law printer to the king.

**Richelieu** (rêsh-lyeu), **ARMAND JEAN DU PLESSIS, CARDINAL, DUC DE** (1585-1642), French statesman, b. at Paris. He was the son of François Duplessis, seigneur de Richelieu in Touraine, and was originally destined for the army; but his brother, Alphonse, having resigned the bishopric of Luçon, this was be-

### Richmond

stowed on him by Henry IV (1606). He obtained from the pope a dispensation allowing him to accept the office though under age, and in 1607 was consecrated by the Cardinal de Givry in presence of the pope himself (Paul V). He went to Paris in 1614 as deputy of the clergy of Poitou to the states general, and insinuated himself into the favor of the queen mother, Marie de Medici, who obtained for him the post of grand almoner, and in 1616 that of secretary of state for war and foreign affairs. When Louis XIII quarreled with his mother (1617) Richelieu was banished first to Blois and then to Avignon. In 1620, however, he managed to effect a reconciliation between Mary of Medici and her son. He now obtained, through the influence of the queen mother, the cardinal's hat, and in 1624 was admitted into the council of state. From this date he was at the head of affairs, and he at once began systematically to extend the power of the crown by crushing the Huguenots, and overthrowing the privileges of the great vassals; and to increase the influence of the French monarchy by undermining that of the Hapsburgs, both beyond the Pyrenees and in Germany. After the suppression of the Huguenots his next step was the removal of the queen mother from court, she having endeavored to effect his fall. In 1631 Richelieu was raised to the rank of duke. In 1632 a rising in favor of the Duke of Orleans, the king's brother, was suppressed by the royal forces directed by Richelieu, and the Duke of Montmorency was executed. The whole period of his government was marked by a series of conspiracies of the feudal nobility, the queen mother, the queen herself, and even Louis, against the royal power exercised by Richelieu. Richelieu was a great statesman, but he was proud, arrogant, and vindictive. He was a patron of letters and art, and founder of the French Academy and the Jardin des Plantes.

**Richmond**, Madison co., Ky., 25 mi. s.e. of Lexington. Railroads: Louisville & Nashville, and R. M. I. & B. Iron, coal, and lumber in vicinity. It is noted for breeding horses, and is the seat of the Central University of Kentucky. Pop. 1900, 4,653.

**Richmond**, Henrico co., Va., the state capital, on the James River, 97 mi. s.w. of Washington. Railroads: Richmond & Danville; Chesapeake & Ohio; Newport News & Miss. Valley; Richmond & Allegheny; Richmond, Fredericksburg & Potomac; and Richmond & Petersburg. Steamers to New York, Baltimore, and Philadelphia. Industries: extensive tobacco and cigar factories, large flouring mills and iron works. It does a considerable trade in flour and tobacco and has immense water power from the falls of the James. It is the seat of Richmond College and other institutions of learning. Richmond was first settled in 1609 and was made capital of the commonwealth in 1779. In 1861 it was made capital of the Confederate states and was the objective point of the operations of the Union army in Virginia. Pop.

## Richmond

**Richmond**, county seat of Wayne co., Ind., 68 m. e. of Indianapolis; on the Whitewater river, and on the Grand Rapids & Ind. and the Pitts., Cinn., Chi. & St. L. railroads. Richmond is in an agricultural region and has a brisk local trade. It manufactures iron, machinery, furniture and coffins. The city has an abundant supply of natural gas. Among the public buildings are a good courthouse, a state insane asylum, and the Home for Friendless Women. Pop. 1900, 18,226.

**Richter** (rĕh'tĕr), EUGEN, German politician, b. at Düsseldorf 1838. He entered the Prussian Diet in 1869, and the Imperial Diet in 1871, and is the able and acknowledged leader of the Progressist Liberals. He is the author of several economic publications, and an eminent authority on financial questions.

**Richter**, JEAN PAUL FRIEDRICH, commonly called JEAN PAUL (1763-1825), German writer, was b. at Wunsiedel, in the Fichtelgebirge. In 1781 he entered the University of Leipsic in order to study theology, but soon changed his plan, and devoted himself to literature. In 1784 he was forced by poverty to leave Leipsic. In 1787-94 he was a private tutor, but in the meantime he had published his *Greenland Lawsuits*, *Selection from the Devil's Papers*, and the romance, *The Invisible Lodge*. The last named work brought him fame. Then followed in rapid succession, and with decided success, *Hesperus*, *Life of Quintus Fixlein* and *Flower, Fruit and Thorn Pieces*. But his best works are the romances, *Titan* (1803) and *Wild Oats* (1804), and his philosophical treatise *Introduction to Aesthetics* (1805). Richter is the greatest humorist of modern German literature. His works are, moreover, full of sound philosophy and real poetry, but lack artistic literary form.

**Ricochet Firing**, the firing of guns, mortars, or howitzers with small charges and low elevation, so as to cause the balls or shells to bound along. It is very destructive, and is frequently used in sieges to clear the face of a ravelin, bastion, or other work, dismounting guns and scattering men; and may also be used against troops in the field.

**Rideau** (ri-dō') **Canal**, a Canadian canal constructed between Kingston on Lake Ontario and Ottawa as a through waterway by means of the River Ottawa to Montreal, the St. Lawrence route being interrupted by rapids. Canals have since been built along the St. Lawrence to avoid these, and the Rideau is now little used.

**Riding** is the art of sitting on horseback with firmness, ease, and gracefulness, and of guiding the horse and keeping him under perfect command. Walking, trotting, and galloping are the three natural paces of the horse, but these may be converted into artificial paces by art and skill, by shortening or quickening the motion of the horse. The position of a rider should be upright in the saddle; the legs and thighs should be turned in easily, so that the fore part of the inside of the knees may press and grasp the saddle, and the legs hang down easily and naturally, the feet being par-

## Rifle

allel to the horse's sides, neither turned in nor out, only that the toes should be kept a little higher than the heels. The hand holding the reins is generally kept clear of the body, and immediately over the pommel of the saddle. A firm and well-kept balanced position of the body is of the utmost consequence, as it affects the horse in every motion, and the hands and legs ought to act in correspondence with each other in everything, the latter being always subservient to the former. The art of riding is not difficult of attainment, but it is one which can only be mastered by practical instruction and constant practise.

**Ridpath**, JOHN C., b. in Indiana in 1830. He was educated at De Pauw University, and became instructor in Thorntown Academy in 1859. In 1867 he was professor in Baker University, Kansas. He returned to De Pauw in 1869, and in 1879 became its vice president. Among his books are, *Academic History of the U. S.*, *Popular History of the U. S.*, *Life and Work of Garfield*, *History of Texas*, and *Cyclopedia of Universal History*, *Great Races of Mankind*, etc. Died 1900.

**Rien'zi**, COLA DI (1312-1354), a native of Rome. In 1347, during the absence of the governor of Rome, he summoned a secret assembly of his friends upon Mount Aventine, and induced them all to subscribe an oath for the establishment of a plan of government which he called the *good estate*. The people conferred upon him the title of tribune, with all the attributes of sovereignty. He banished several noble families, and compelled Colonna to quit Rome. His strict regard to justice and the public good in the first exercise of his power induced even the pope to countenance him. But he subsequently became ambitious and haughty, and finding he had lost the confidence of the people he withdrew from Rome in 1348. He returned secretly to Rome in 1350, but was discovered, and fell into the hands of Pope Clement at Avignon, who imprisoned him for three years. Innocent VI released Rienzi, and sent him to Rome to oppose another popular demagogue named Boroncelli. But after a turbulent administration of a few months he was killed.

**Riesengebirge** (rĕ'zen-gĕ-birgĕ), a mountain range of Europe, separating Silesia from Bohemia and Moravia, till it joins the Carpathians; but the name is properly applied to that part of this range which lies between the sources of the Neisse and the Bober. It contains the loftiest mountains of the north or central parts of Germany, the Schneekoppe being 5,257 ft. high.

**Rifle**, a portable firearm, the interior surface of the barrel of which is grooved, the channels being cut in the form of a screw. The number of these spiral channels or threads, as well as their depth, varies in different rifles, the most approved form being with the channels and ridges of equal breadth, and the spiral turning more quickly as it nears the muzzle. The bullet fired is now always of an elongated form. The great advantage gained by a weapon of this construction is that the

## Rifle

bullet discharged from the piece, by having a rotatory action imparted to its axis coincident with its line of flight, is preserved in its direct path without being subject to the aberrations that injure precision of aim in firing with unrifled arms. As a necessary consequence of the projectile being carried more directly in its line of aim, its length of range, as well as its certainty in hitting the object, is materially increased. Rifles were invented in Germany in 1498, and have been used as military weapons since 1631. In 1851 the first rifle firing an elongated bullet came in under the name of the Minié. It was succeeded in 1853 by the Enfield rifle. The chief feature of this rifle was the reduction of the bore to .577 in. in diameter, which made it considerably lighter. Next came the breech-loading rifle. In this rifle the breech is closed by a block which contains a piston or striker, the latter exploding the cartridge by the force of a strong spiral spring passing round it. The German needle rifle and the French Chassepot rifle were the first of the breech-loading rifles to acquire a reputation in actual warfare. The Springfield rifle is used by the U. S. army.

The repeating rifle is a development of a very old type of weapon. In the Spencer, the first used with signal success, the cartridges are in the stock of the arm; in the Winchester, the best known of repeating rifles, they are in a tube underneath the barrel. More modern military magazine rifles draw their supply of cartridges from a reserve contained in a detachable magazine, the advantage being the greater efficiency of the weapon as a single loader. The Lebel rifles, originally furnished with a tubular magazine, are now being converted to a more modern type. The breech mechanism usually preferred is that upon the "doorbolt" principle, of which the Chassepot and Prussian needle gun are well-known types; the Winchester is one of the few actuated by an under lever, and the Colt is worked by a sliding boss placed under the barrel. In the Mannlicher the bolt is drawn back simply; in others it has to be turned to the left before it can be withdrawn. With the Lebel the breech-bolt has two projections, which, when the bolt is turned, securely lock the bolt close to the base of the cartridge; in the Enfield-Lee, a similar double-locking arrangement is placed where the projecting knob to actuate the mechanism joins the breech-bolt. The magazine of the Enfield Lee, containing eight cartridges, is placed under the stock behind the barrel, to the level of which a spiral spring in the magazine raises the cartridges. The breech-bolt which contains the firing mechanism and extractor, when pushed forward forces the raised cartridge into the barrel. The magazine is detached by pressing a "catch" or blocked by a "cut-off" when the rifle may be used as a single loader.

Sporting rifles have a shorter range and inferior velocity to the best military weapons, their object being not extreme range or penetration, but great force at impact to produce such a shock as will paralyze the game shot.

## Ring

**Riga**, a seaport of Russia, capital of the government of Livonia, on both sides of the Duna or Dwina, about 5 mi. above its mouth, in the Gulf of Riga. The public buildings are numerous, but few of them are deserving of particular notice, except the cathedral, St. Peter's church, the castle or governor's residence, and the townhall. The manufactures are not of great importance, but the trade is very extensive, the principal exports being flax, hemp, timber, linseed, grain, etc. Ships can come up to the town, or they may unload and take in cargo at Dünamünde, the port and fortress at the mouth of the river. Half of the trade is with Britain. Pop. 175,332, of whom nearly half are Germans, and Protestants by religion.

**Riga** (or Livonia), **GULF OF**, a gulf of the Baltic, which washes the coasts of Courland, Livonia, and Esthonia, and contracts in the west to a comparatively narrow entrance, the Island of Osel almost closing it on the north-west. The chief river which it receives is the South Dwina.

**Right of Way**, the right of passing over land which is not one's own. Rights of this kind are public if enjoyed by everybody; private, if enjoyed by a certain person or description of persons. Wherever there is a public right of way, there is a highway. The origin of a highway is generally said to be in a dedication thereof by an owner to the public; and such dedication may be express or implied. It will be implied from the use of the highway by the public for a moderate number of years. But a highway may also be established by act of legislature. A private right of way may be grounded on a special permission, as where the owner grants to another the liberty of passing over his land.

**Rigi** (rē'gē), an isolated rocky mountain of Switzerland, in the canton of Schwyz, between lakes Zug and Lucerne, 5,905 ft. high. It affords some of the finest views in Switzerland, and is annually visited by numerous travelers.

**Riley**, JAMES WHITCOMB, American poet, b. in Indiana in 1853. He began life as an itinerant sign painter, and later performed in a theatrical company. His literary work began in 1875. He contributed to several newspapers and magazines. Among his literary works are: *The Old Swimm' Hole* and *'Leven Other Poems, Character Sketches and Poems, Afterwhiles, Green Fields and Running Brooks, Armazindy, Child World*. Pl. 24, Vol. III.

**Ring**, an ornament for the fingers which has been worn from the most ancient period of civilization. Among the ancient nations who are known to have attached special importance to the wearing of rings were the Assyrians, Egyptians, Hebrews, Greeks, and Romans. The nose, ears, arms, and even the legs and toes have also, among various people, been decorated with them. Rings have also from a very early period been reckoned as symbols of authority, which could be delegated by merely delivering the ring to an agent; they were also used as symbols of subjection. The earliest mention of rings is in the book of Genesis, and



## Ringworm

relates to the Hebrews. Among the Egyptians rings of gold were worn in great profusion. The common people wore porcelain rings. The Greeks and Romans used them for sealing contracts, closing coffers, etc. The modern use of wedding rings was probably derived from the Jews. A ring appears from an early period to have been one of the insignia of a bishop. Doctors were formerly expected to wear a ring on the third finger of the right hand.

**Ringworm**, a chronic contagious disease of the hair, hair-bulbs, and epithelial covering of the skin. It is due to a microscopic fungus, which lays hold upon and preys upon these tissues, and is very contagious. It is known by the decolorization and brittleness of the affected hairs, by the scaly eruption, and roundness of the affected patches. Ringworm is most commonly found on the scalp. The treatment of the disease consists in destroying the vitality of the fungus, which is effected by a solution of sulphurous acid or of corrosive sublimate.

**Rio-de-Janeiro** (rē-o-de-zhā-nā'i-ro), the capital of the republic of Brazil, and the largest city of South America, is most beautifully and advantageously situated on the southeastern coast, on a fine natural harbor formed by a bay of the same name. The city, which has a picturesque appearance from the bay, is built on flat ground along the shore or on the slopes of low hills. Upon nearer approach it is found that the houses are small and mean looking, the streets narrow and ill-paved, especially in the older part, and that even the public buildings are without much architectural merit. The finest buildings are the opera house, senate house, military barracks, and the national museum, while the churches are chiefly notable for their gaudy interior decorations. A striking feature in the city is the aqueduct, which brings the water a distance of 12 mi. and here crosses a wide valley on a beautiful double tier of granite arches. Among benevolent institutions are the Casa da Misericórdia, several other hospitals, and a large lunatic asylum. There are two colleges, medical schools, a naval and military academy, numerous scientific establishments, public schools, national library, a botanical garden, and observatory. At Rio is the chief military arsenal of the republic, while on one of the islands in the bay there is a naval arsenal with docks and building yards. The bay has its entrance, 1,700 yds. wide, between Fort St. Juan and Fort Santa Cruz, and extends inward 15 mi., with a width varying from 2 to 8 mi. It is diversified with numerous islands, surrounded by hills covered by luxuriant tropical vegetation, and affords safe anchorage for the largest vessels. Manufactures are unimportant, but there is an extensive trade in coffee, sugar, hides, tobacco, timber, etc. The principal imports are linen, woolen, and cotton tissues, iron and steel goods, and provisions and preserved meats. The city is the central terminus of the railways of the country; tramways have also been worked for some time.

## Rio Negro

The first settlement in the neighborhood of Rio-de-Janeiro was formed by some French refugees in 1555. A Portuguese force took possession of the settlement in 1567, and laid the foundations of a new city, which has grown into the present capital of Rio-de-Janeiro. Pop. 500,000. The province of Rio-de-Janeiro has an area of about 28,000 mi., and is decidedly mountainous in the center. It is the best cultivated province in Brazil, the chief crop being coffee. Immense herds of cattle are reared, and the forests are rich in timber. Pop. 1,164,468.

**Rio Grande**, a large river of the U. S., rises in the San Juan Mountains in southwestern Colorado, and flows generally southeastward into the Gulf of Mexico, forming on its way the entire boundary between Texas and Mexico. Its length is about 1,800 mi.; it is for the most part a shallow stream, but small steamboats can ascend for nearly 500 mi. Its chief affluent is the Rio Pecos.

**Rio-Grande-do-Norte** (Grand River of the North), a maritime province in the northeast of Brazil; area 22,196 sq. mi. The surface is mountainous, and not generally fertile. Agriculture and cattle-rearing form the principal branches of industry. The capital is Natal or Rio-Grande-do-Norte (pop. 8,000), a seaport at the mouth of the small river Rio-Grande-do-Norte, exporting some cotton, sugar, etc. Pop. of prov. 1891, 308,852.

**Rio-Grande-du-Sul**, the most southern province in Brazil, bounded partly by the Atlantic, and bordering with Uruguay and the Argentine Republic, has an area of 91,336 sq. mi., and a pop. of 564,527. It is well watered, contains much fertile land, and has a healthy climate. On the coast is the large lake or lagoon of Patos, besides others. The chief occupations of the inhabitants are cattle-rearing and agriculture. Among the population are 100,000 Germans, there being a number of flourishing German settlements. There are some 600 mi. of railway. Hides, tallow, horsehair, bones, etc., are exported. The capital, Rio-Grande, or São Pedro do Rio-Grande, is situated on a peninsula near where the Lake of Patos communicates with the Atlantic. Its houses are mostly of earth, and its streets unpaved. It has an active trade in hides, horsehair, wool, tallow, etc. Pop. 18,000 or 19,000.

**Rioja** (rē-ō'hā), LA, one of the western provinces of the Argentine Republic, well watered on the west, but in the east and south are salt and sand deserts. The climate is dry and healthy. The inhabitants chiefly engage in agriculture and cattle-rearing. Excellent wheat, wine, and fruits are produced. Pop. 100,000.

**Rio Negro** (Spanish "black river"), the name of numerous streams, of which two are important: 1, A river of South America, and principal tributary of the Amazon. It rises in Colombia, and joins the Amazon after a course of about 1,000 mi. at Manaus, Brazil. Through its affluent, the Cassiquiare, there is direct communication between the Amazon and Orinoco. 2, A river of South America forming the boundary between the Argentine Republic

## Riot

and Patagonia. It rises in the Andes in Chile, and is about 700 mi. long. Its current is very rapid, and its bed obstructed with shoals and sand banks.

**Riot**, a disturbance of the public peace, attended with circumstances of tumult and commotion, as where an assembly destroys, or in any manner damages, seizes, or invades private or public property, or does any injury whatever by actual or threatened violence to the person of individuals. By the common law a riot is an unlawful assembly of three or more persons which has actually begun to execute the common purpose for which it assembled by a breach of the peace, and to the terror of the public. A lawful assembly may become a riot if the persons assembled form and proceed to execute an unlawful purpose to the terror of the people, although they had not that purpose when they assembled. In the U. S. it is conceived that by the common law the authorities have power to suppress riotous assemblies by violent means.

**Ripley**, GEORGE (1802-1880), an American author, b. at Greenfield, Mass. Educated at Harvard College and Cambridge Divinity School, he became a Unitarian minister in Boston, lived some years in Europe, was one of the founders of the *Transcendental* magazine, the *Dial* (on which he had Emerson and Margaret Fuller as coadjutors), and the originator and conductor of the communistic experiment at Brook Farm. He became literary editor of the New York *Tribune* in 1849, and was joint editor with C. A. Dana of the *American Cyclopædia* (1858-63, 16 vols., also of the second edition.)

**Ripple Marks**, the wavy or ridgy marks left on the beach of the sea, lake, or river by the ripples or wavelets. Such marks have often been preserved when the sand has hardened into rock, and are held by geologists as indications that deposition of the beds in which they occur took place on the sea shore or at a depth not greater than 60 ft. We have also wind ripple marks and current ripple marks.

**Rip Van Winkle**, the hero of Washington Irving's delightful sketch (1820), an idle, good-natured, henpecked scapegrace, who neglects—he cannot be said to cultivate it—a patch of maize and potatoes in a small village near the Hudson River, and who, with his gun and dog Wolf, his companion in idleness, seeks a refuge from the scolding tongue of his sorely-tried but termagant wife in the forests of the Catskill Mountains. There he falls in with Hendrick Hudson and his crew of the *Half Moon*, who are playing at ninepins in a secluded hollow, the balls as they roll echoing along the mountains like rumbling peals of thunder. Rip is directed to wait on them, and while doing so tastes and returns to the liquor he hands, till his senses forsake him. He awakens on a bright summer morning, his dog gone, and a rusty firelock by his side; his beard has grown a foot long, and in the village he finds new buildings, new names over the doors, new faces at the windows. His own house is fallen into decay, his wife is dead—there is a drop of comfort, at

## Rivers

least, in this intelligence—and he who went away a subject of George the Third has returned to find himself a free citizen of the U. S. His sleep, he discovers, has lasted twenty years, and meantime the American Revolution has passed and left all things changed. Rip, however, is recognized by some of his old cronies, finds a home at his daughter's house, and for many more years is as comfortable at the door of the new wooden Union Hotel as ever he was at old Nicholas Vedder's quiet Dutch inn. The story has been often dramatized in America, but no version has held the stage except Boucicault's (1865), with which the name of Joseph Jefferson is identified.

**Rishis**, certain sages of the Hindu mythology, sprung from the mind of Brahma. Seven of them are enumerated. The term afterward came to be applied to all personages distinguished for piety and wisdom.

**Rittenhouse**, DAVID (1732-1796), astronomer, b. in Pennsylvania. Originally a clock and mathematical instrument maker, he became master of the U. S. mint, and succeeded Franklin as president of the American Philosophical Society. He was the first to use spider lines in the focus of a transit instrument.

**Ritualism**, a strict adherence to rites and ceremonies in public worship. The term is more especially applied to a tendency recently manifested in the Church of England, resulting in a series of changes introduced by various clergymen of the High Church party into the services of the church. These changes may be described externally as generally in the direction of a more ornate worship, and as to their spirit or animating principle, as the infusion into outward forms of a larger measure of the symbolic element.

**Rivers** rank high in importance among the natural features of the globe, and are intimately connected with the history and condition of mankind. They have always formed important highways of communication, and the great cities built upon their banks have constituted in all ages the seats of empire. Every circumstance concerning rivers is therefore of importance, as their source, length of channel, outlet, rapidity of current, depth, and consequent capability of navigation.

THE LARGEST RIVER SYSTEMS.

River.	Area of Basin, sq. mi.	Length, mi.	Annual Rainfall of Basin, cu. mi.	Mean Annual Discharge, cu. mi.
Amazon.....	2,230,000	3,400	2,894	528.0
Congo.....	1,540,000	2,600	1,218	419.0
Nile.....	1,230,000	3,700	822	24.3
Mississippi.....	1,230,000	4,100	673	125.0
Niger.....	1,060,000	2,600	...	...
Obi.....	1,190,000	3,200	...	...
La Plata.....	995,000	2,300	905	189.0
Lena.....	942,000	2,900	...	...
Yenisei.....	890,000	3,200	...	...
Yang-tse-kiang.....	689,000	3,200	409	125.0
Mackenzie.....	607,000	2,300	...	...
Volga.....	592,000	2,200	152	43.7
Ganges and Brahmaputra.....	588,000	1,800	549	43.3
Zambezi.....	570,000	1,600	...	...
St. Lawrence.....	555,000	2,400	339	67.3
Winnipeg-Nelson.....	504,000	1,500	...	...
Yukon.....	483,000	2,200	...	...
Orinoco.....	480,000	1,400	603	122.2
Amur.....	408,000	2,800	115	26.6
Hoang-ho.....	387,000	2,600	104	26.0
Indus.....	360,000	1,900	190	67.5
Danube.....	320,000	1,700	...	...
Murray.....	300,000	1,500	...	...

By law navigable rivers are held to be the property of the state (so far as navigation extends); non-navigable rivers belong to the proprietors through whose grounds they flow. The state has thus control and jurisdiction of the shores of navigable streams, while in the case of a non-navigable stream the proprietors of estates on opposite banks of it are supposed to own the ground over which it flows respectively to the center of its bed, and may fish it accordingly. They do not own the water, the property in which is shared by the owners above and below. A particular proprietor cannot dam up or divert the water, or alter the banks so as to injure the property of his neighbor. Strict laws for the prevention of pollution of rivers have been enacted by the legislatures of the different states of the Union, this more especially in the vicinity of towns and cities, where the local authorities are charged with their enforcement. This subject has of late years commanded much attention.

**Riverside**, Riverside co., Cal., 60 mi. e. of Los Angeles. Railroads: Santa Fe, and Southern Pacific. Industries: iron foundry, and large wine factory. Surrounding country fruit growing. The town was first settled in 1871 and became a city in 1883. Population, 1900, 7,973.

**River Tortoise**, a name of a family of tortoises that are aquatic in their habits, coming to shore only to deposit their eggs. They are exclusively carnivorous, subsisting on fishes, reptiles, birds, etc. The edges of the mandible are so sharp and firm that they easily snap off a man's finger. Well-known species are the soft-shelled turtle and the large and fierce snapping turtle of America. They inhabit almost every river and lake in the warmer regions of both hemispheres, and are particularly plentiful in the Ganges, where they prey on human bodies.

**Rives**, AMELIA, b. in Richmond, Va., in 1863. Her first work was produced in 1888 and was entitled, *A Brother to Dragons*. Her later writings include, *Virginia of Virginia*, *The Witness of the Sun*, *According to St. John*, and *Athebehold*. She was married in 1888 to John Armstrong Chandler, from whom she was divorced. In 1896 she married Pierre Troubetskoi, son of a Russian prince.

**Roads** are artificial pathways formed through a country for the accommodation of travelers and the carriage of commodities. Though the Romans set an example as roadbuilders, some of their public highways being yet serviceable, the roads throughout most of Europe were in a wretched condition till toward the end of the eighteenth century. France was in advance of other countries in roadmaking. The first important point to be considered in roadmaking is the route to be followed, a matter in which natural obstructions and inequalities of level have to be taken into account, besides the question of directness of route, the deviations advisable in order to accommodate certain centers of population, the expense of upkeep, etc. Natural obstructions are overcome by special contrivances, such as bridges, embank-

ments, tunnels, etc. When diversities of level are necessary, road engineers fix the degree of inclination at the lowest possible point. Telford estimated the maximum inclination of a road to be 1 in 24, but except in extreme cases it is considered better that it should not exceed 1 in 50. The *angle of repose*, or maximum slope on which a carriage will stand, has been estimated at 1 in 40. The width of the road is also a very important consideration as bearing both on the original cost and on the permanent maintenance. A properly constructed road, besides a foundation, consists of two layers, an upper and an under. After a good foundation is obtained the laying of a base, the best material being concrete of gravel and lime, gives durability to the road. Upon this base the actual roadway is laid with a slight inclination from the center to the sides for the purpose of drainage. Before the time of Macadam it was customary to use broken stones of different sizes to form the roadway, the consequence being that in course of time the smaller stones sank, making the road rough and dangerous. Macadam early in the present century introduced the principle of using stones of uniform size from top to bottom.

The general superintendence of roadways is usually exercised by the government of a country, but it intrusts the execution of its enactments to local authorities. Highways are public roads which every citizen has a right to use. They are constituted by prescription, by act of legislature, or by dedication to the public use.

**Roanoke**, Roanoke co., Va. Railroads: Norfolk & Western, and Shenandoah Valley. Industries: locomotive works and car shops, iron, steel, and machinery works, and a tobacco factory. It is in an iron mining and tobacco growing district. Near here are mineral springs of great value medically. Pop. 1900, 21,495.

**Roanoke** (ro-a-nōk'), a river in Virginia and North Carolina. It flows chiefly s.e., and after a course of about 250 mi. falls into Albemarle Sound. It is tidal for 75 mi. and is navigable for double that distance for small vessels.

**Robbery**, a felonious and forcible taking away another man's goods or money from his person, presence, or estate by violence or putting him in fear. Violence or intimidation is the criterion which distinguishes robbery from other larcenies; and it is sufficient that so much force or threatening, by word or gesture, is used as might create an apprehension of danger, so as to lead a man to part with his property against his will. Highway robbery, or the forcible taking of property from travelers, in many countries is a capital offense, and in all civilized countries is severely punished.

**Robert**, duke of Normandy, surnamed the *Devil*, was the younger son of Duke Richard II by his marriage with Judith; a daughter of Count Godfrey of Brittany. In 1027 he succeeded his elder brother, Richard III, whom he is charged with having poisoned. The first years of his government were employed in



## Robert II

bringing his rebellious vassals into subjection, and he then restored Count Baldwin of Flanders to his estates, assisted Henry I, king of France, against his mother Constantia, and humbled Count Otto of Champagne. His heroic deeds and penance have given rise to numerous stories. William the Conqueror was his son.

**Robert II** (1316-1390), king of Scotland, was the son of Marjory, daughter of Robert Bruce, and of Walter, steward of Scotland, and was thus the first of the *Stuart* kings. He was recognized by Parliament in 1318 as heir to the crown. On the death of David II he was crowned at Scone 1371. His reign was comparatively a peaceful one, one of the chief events being the battle of Otterburn.

**Robert III** (1340-1406), king of Scotland, eldest son of the preceding, was originally called John, but changed his name on his coronation, in 1390. War was renewed with England, and the battle of Homildon Hill, 1402, resulted in a disastrous defeat of the Scots. In this year the Duke of Rothesay died in Falkland Castle, where he had been imprisoned. Dread of Albany, who had recovered the regency, induced the king to send his second son, James, to France in 1406; but his vessel was captured by the English, and Henry IV long detained him as a prisoner.

**Roberts, DAVID, R. A.** (1796-1864), painter, was b. in Edinburgh. After a seven years' apprenticeship he became a scene painter, and in 1821 was engaged as painter for Drury Lane Theater. From 1836-39 he furnished the drawings for the *Landscape Annual*, for *Picturesque Sketches in Spain*, and for *Bulwer Lytton's Pilgrims of the Rhine*. In 1838 he made a tour in the East, after which he published *Sketches in Egypt, The Holy Land*, etc. His *Destruction of Jerusalem* appeared in 1849; the *Inauguration of the Exhibition of all Nations*, 1853; *Rome*, 1855; *Christmas Day and St. Peter's at Rome*, 1856. In 1859 he published an illustrated volume entitled *Italy—Classical, Historical, and Picturesque*, and at the time of his death he was engaged on a series of views of *London from the Thames*. Roberts is considered the best architectural painter Britain has produced, and as a painter of interiors he has few equals.

**Robertson, FREDERICK WILLIAM** (1816-1847), a celebrated preacher, was b. in London. He became incumbent of Trinity Chapel, Brighton, in 1847, and continued in this charge with increasing fame as a preacher till his death. His views on the Sabbath, the atonement, baptism, and inspiration were assailed as unorthodox, and he was accused of preaching democracy and socialism.

**Robertson, THOMAS WILLIAM** (1829-1871), dramatist. In 1864 he had considerable success with *David Garrick*, a play written by Sothorn; but his fame rests on a series of plays produced at the Prince of Wales's Theater, including *Ours*, *Caste*, *Play*, *School*, and *M. P.* Though sneered at on their production by certain critics, and nicknamed "cup-and-saucer dramas," they have deservedly secured a permanent place on the stage.

## Robinson

**Robespierre** (rob-es-pi-är), FRANÇOIS MAXIMILIEN JOSEPH ISIDORE (1758-1794), was b. at Arras. He was educated at the College of Louis-le-grand at Paris. He afterward practiced as an advocate at Arras, and held for a short period the position of judge in the bishop's diocese. In 1789 he was elected deputy to the states general, and was a zealous supporter of democratic measures. At this time he became a prominent member of the Jacobins and other revolutionary clubs. In March, 1791, he was appointed public accuser to the New Courts of Judicature. He remained in the background during the September massacres of 1792, which he assisted in planning, leaving the work with Marat and Danton. In the same month he was elected a member of the Convention, and in the proceedings against Louis XVI distinguished himself by the relentless rancor with which he opposed every proposal to avert or delay the fatal result. On March 19, 1794, Hébertists fell victims to his jealousy. Eleven days later he caused Danton to be arrested, who, after a trial of three days, was guillotined, together with Camille Desmoulins, on April 5. Robespierre's power now seemed to be completely established, and the Reign of Terror was at its height. A party in the Convention was formed against Robespierre, and on July 27 he was openly accused of despotism. A decree of arrest was carried against him, and he was thrown into Luxemburg prison. He was released by his keeper on the night of the same day, and conducted to the Hall of Commune, where his supporters were collected. On the following day Barras was sent with an armed force to effect his arrest. Robespierre's followers deserted him, and he was guillotined on July 27, 1794, with twenty-three of his supporters.

**Robin.** See *Redbreast*.

**Robinson, REV. EDWARD, D.D., LL.D.** (1794-1863), biblical scholar and explorer of the Holy Land, b. at Southington, Conn. He graduated at Hamilton College, Clinton, N. Y., and in 1823-26 was an instructor in Hebrew in Andover Theological Seminary. In 1826 he went to Europe, studied at Göttingen, Berlin, and Halle, and returned in 1830 to his native country; became a professor of biblical literature at Andover, and published several works elucidating sacred history and literature. In 1833 he resigned his professorship, and subsequently resided some years at Boston. In 1837 he made a voyage to the Holy Land, returning to Berlin in 1838. The result of this journey was his great work entitled *Biblical Researches in Palestine, Mount Sinai, and Arabia Petraea* (1841, 3 vols.), subsequently enlarged after a second visit to Palestine in 1852. He had been appointed to the chair of biblical literature in Union Theological Seminary, New York, but only entered on the duties in 1840, occupying the post till his death. He also wrote a physical geography of the Holy Land. His second wife (married in 1828), Therese Albertine Louise von Jakob (1797-1870), b. at Halle, was known as an author before her marriage under the name of Talvi. In 1822

## Robinson Crusoe

she published translations of *Old Mortality* and the *Black Dwarf* in German. In 1825-26 she published *Volkslieder der Serben* and a few tales under the nom-de-plume of Psyche, and in 1834 translated into German Pickering's work on the Indian tongues. She also wrote a *Review of the Slavic Languages, Characteristics of the Popular Songs of the German Nations* (1840), wrote several novels, and contributed to magazines both German and English.

**Robinson Crusoe**, a celebrated romance, written by the well-known Defoe and published in 1719. See *Defoe*.

**Rob Roy** (that is "Robert the Red") (1660-1734), a celebrated Highland freebooter, whose true name was Robert Macgregor, but who assumed his mother's family name, Campbell, on account of the outlawry of the clan Macgregor by the Scotch parliament in 1662. He was the younger son of Donald Macgregor of Glengyle, by his wife, a daughter of Campbell of Glenfalloch. His own designation was of Inversnaid, but he seems to have acquired a right to the property of Craig Royston, on the east side of Loch Lomond. Like other Highland gentlemen, Rob Roy was a trader in cattle previous to the rebellion of 1715, in which he joined the adherents of the Pretender. On the suppression of the rebellion the Duke of Montrose, with whom Rob Roy had previously had a quarrel, took the opportunity to deprive him of his estates; and the latter began to indemnify himself by a war of reprisals upon the property of the duke. An English garrison was stationed at Inversnaid, not far from Aberfoyle, the residence of Rob Roy; but his activity and courage saved him from the hands of his enemies, from whom he continued for some time to levy blackmail. In his latter years he became reconciled to Montrose, and d. at Balquhider. See Sir Walter Scott's introduction to the novel of *Rob Roy*.

**Roc**, a fabulous bird of immense size and strength, which is mentioned in the *Arabian Nights Entertainments*. A belief in it was spread in Europe during the Middle Ages, having been brought from the East probably as a consequence of the Crusades.

**Rochambeau** (ro-shān-bō), JEAN BAPTISTE DONATIEN DE VIMEUR, COUNT DE (1725-1807), marshal of France, entered the French army in 1742, distinguished himself in the Seven Years' War, and became field-marshal in 1761. In 1780-82 he commanded the French forces sent to aid the revolted British colonists in America. He became governor of Artois and Bicardy, and subsequently of Alsace, was made a marshal in 1790, and commanded the army of the north in 1792. During the Reign of Terror he narrowly escaped the guillotine.

**Rochdale**, a municipal and parliamentary borough of England, in Lancashire, 10 mi. n. n. e. of Manchester. Rochdale is a place of considerable antiquity, and was early noted for its woolen manufactures, which have remained a chief staple till the present day. Cotton is extensively manufactured, and there are also foundries, machine shops, etc.; while in the

## Rochester

neighborhood are quarries of freestone and extensive collieries. Rochdale is the center of the co-operative movement, which originated there in 1844. By means of canals it has a water communication with all the industrial centers of the north of England. Pop. 1891, 71,458.

**Rochefort** (rosh-för) (or Rochefort-sur-Mer), a strongly fortified seaport and naval arsenal of France, in the department of Charente-Inférieure, on the right bank of the Charente, about 9 mi. above its mouth, 20 mi. s. of La Rochelle. In the military port the largest vessels float at all times. Attached to it are shipyards, workshops, and storehouses of various kinds. A large naval hospital is outside the town. There is a good trade in colonial produce, wine, brandy, etc. Pop. 26,534.

**Rochefort** (rosh-för), HENRI (VICTOR HENRI, MARQUIS DE ROCHEFORT-LUÇAY) (1832- ), a French journalist, dramatist, and politician, b. in Paris. On the death of his father in 1851 he obtained a post in the prefecture. In 1859 he wrote for the *Charivari*, and became one of the principal writers on the *Figaro*. Having been dismissed from the latter post by order of the ministry, he founded a weekly paper called *La Lanterne* in 1868, in which he vigorously attacked the emperor and the ministry. In 1869 he was returned to the legislative assembly by the first arrondissement of Paris. He then started a new paper, the *Marseillaise*, and for its attacks on the imperial family he was sentenced to six months' imprisonment, in January, 1870. After Sedan he became a member of the government of National Defense. He fled from Paris in May, 1871, but was arrested by the Versailles government and sentenced to transportation to New Caledonia. He escaped in 1874, and after the general amnesty of 1880 returned to Paris (July 12), where he founded his new journal, *The Intransigent*. He was returned as deputy by the department of the Seine, but resigned his seat in February, 1886. Since then he has been identified with the Boulangist movement.

**Rochefoucauld**, FRANÇOIS, DUC DE LA. See *La Rochefoucauld*.

**Rochelle** (ro-shell), LA, a fortified town and seaport, France, capital of the department of Charente-Inférieure, on the Atlantic, 95 mi. n. w. of Bordeaux. The harbor is easily accessible and commodious. The roadstead is protected by the islands of Ré and Oléron. La Rochelle has an extensive trade in wines, brandies, and colonial produce. Pop. 17,745.

**Roch'ester**, a city, parliamentary borough, and river port in England, in the county of Kent, 29 mi. s. e. of London, on the Medway, adjoining Chatham. It consists of Roch'ester proper, on the right bank of the river, and of Strood and part of Frindsbury parish on the left bank, communication being kept up by an iron swing-bridge. Pop. 26,309.

**Rochester**, Olmstead co., Minn. Railroad, C. & N. W. Industries: several flouring mills. It is the center of a farming district and has good general trade. Pop. 1900, 6,843.

**Rochester**, Stafford co., N. H., on Cocheco and Salmon Falls rivers, 78 mi. n. of Boston.

## Rochester

Railroads: P. Gt. F. & C.; D. & W.; W. N. & R.; P. & R. Industries: shoe factories, iron foundry, three woolen mills, five box, five brick, three bottling, bicycle, square, auger, fire brick factories, and tannery. Surrounding country agricultural. It is the oldest town of the name in the U. S. Was first settled in 1722 and became a city in 1891. Pop. 1900, 8,466.

**Rochester**, Monroe co., N. Y., on Genesee River, 375 mi. n.w. of New York. Surrounding country agricultural. Railroads: N. Y. C. & H. R.; West Shore; Erie; Lehigh Valley; R. W. & O.; R. & L. O.; Northern Central; B. R. & P.; W. N. Y. & P.; also Erie Canal and steamer lines. Industries: kodak manufacturing, large flouring and woolen mills, iron foundries, farm implement factories, cotton mill, and a large number of factories of all kinds. The town was first settled in 1808 and became a city in 1834. Pop. 1900, 162,608.

**Rockefeller**, JOHN D., b. in Tioga co., N. Y., in 1839. He was educated in the public school of Cleveland, O., and at the age of nineteen entered business on his own account. He was engaged in the oil business in Cleveland, O., at the age of twenty-one, and in 1870 became president of the Standard Oil Company. He was the founder of the new University of Chicago, his endowments amounting to nearly \$7,000,000.

**Rocket**, a projectile consisting of an iron cylinder filled with an inflammable composition, the reaction of the gases produced by the combustion of which, pressing on the head of the rocket, serve to propel it through the air. Rockets were first used in Eastern countries. Sir W. Congreve first made them of iron, and introduced them into the British service under the name of Congreve rockets. They were kept point first by the use of a stick, which acted on the principle of an arrow's feathers. Rockets may be discharged from tubes or troughs, or even laid on the ground. In war rockets are chiefly used for incendiary purposes, for moral effect—especially frightening horses, and for various irregular operations. *Signal* and *sky* rockets are small rockets formed of pasteboard cylinders, filled with combustible materials, which, when the rocket has attained its greatest height and bursts, cast a brilliant light, which may be seen at a great distance.

**Rockford**, Winnebago co., Ill., on Rock River, 90 mi. w. of Chicago. Railroads: Illinois Central; C. M. & St. P.; C. & N. W.; C. B. & Q.; and Kenosha division of C. & N. W. Industries: sugar refinery, three flouring mills, six iron foundries, five woolen mills, cotton mills, and a large number of factories. Surrounding country agricultural. The town was first settled in 1832 and became a city in 1843. Pop. 1900, 31,051.

**Rocking Stones** (or Logan Stones), large blocks of stone poised so nicely upon the point of a rock that a moderate force applied to them causes them to rock or oscillate. Sometimes a rocking stone consists of an immense mass, with a slightly rounded base resting

## Rocky Mountains

upon a flat surface of rock below, so that a single person can move or rock it. Some rocking stones are evidently artificial, having had a mass of rock cut away round the center point of their bases; others are due to natural causes, such as decomposition, the action of wind and water, etc.

**Rock Island**, county-seat of Rock Island co., Ill.; on the Mississippi river, and the C. B. & Q., C. M. & St. P., C. R. I. & P., and the Rock Is. and Peoria railroads; 182 m. w. by s. of Chicago. The city derives its name from an island in the river, belonging to the U. S. government, upon which is situated its central arsenal and armory. A combined railway and highway bridge connects the island with the city and with Davenport, Ia., and another bridge connects it with Moline. The railway and river shipping facilities give Rock Island great commercial importance, and the excellent water-power promotes manufacturing. Manufactures include flour, lumber, vehicles and agricultural implements. Rock Island is the seat of Augustana College. Pop. 1900, 19,493.

**Rockland**, Knox co., Me., on Penobscot Bay, 96 m. from Portland. Railroads: terminus of Knox & Lincoln division of the Maine Central. Several steamboat lines. Industries: lime burning, shipbuilding, clothing, lime casks and other small industries. Pop. 1900, 8,150.

**Rock River**, a river which rises in Wisconsin, 50 mi. w. of Lake Michigan, and falls into the Mississippi 2 mi. below Rock Island City. Length 330 mi., about 225 of which have been ascended by small steamboats.

**Rockville**, Tolland co., Conn., 15 mi. n.e. of Hartford. Railroad: N. Y., N. H. & H. The factories, furnished with abundant water power, produce woolen, silk, cotton goods, envelopes, etc. Pop. 1900, 7,287.

**Rocky Mountains**, a name indefinitely given to the whole of the extensive system of mountains which covers a great portion of the western half of North America, but more properly applied to the eastern border of this mountain region, commencing in New Mexico in about 32° 30' n. lat., and extending throughout the continent to the Polar Sea; terminating west of the Mackenzie River, in lat. 69° n., lon. 135° w. The Rocky Mountains in the U. S. are divided into two parts in Southern Wyoming by a tract of elevated plateaus. The chief groups of the southern half are the Front or Colorado Range, which in Wyoming has a mean elevation of 9,000 ft. (at Evans's Pass, where it is crossed by the Union Pacific Railway, 8,269 ft.). In Colorado it increases to a mean height of 13,000 ft., its highest points being Gray's Peak (14,341 ft.), Long's Peak (14,271 ft.), and Pike's Peak (14,147 ft.). The Sawatch Range, south of the Arkansas River, has its highest peak in Mount Harvard (14,375 ft.), with passes at an elevation of from 12,000 to 13,000 ft. The "Parks" of Colorado are high mountain valleys, known as North, Middle, South, and San Luis parks, with an elevation of from 6,000 to 10,000 ft., surrounded by ranges 3,000 to 4,000 ft. higher. The west border of the San Luis

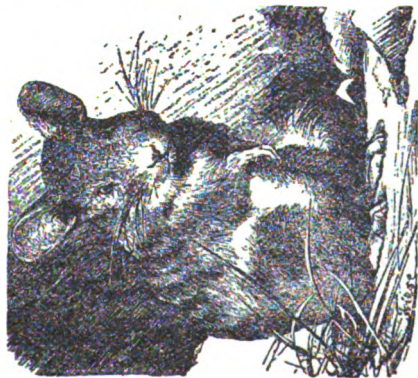




1 Beaver (Castor fiber)



2 Egyptian Jumping Mouse (Dipus aegyptiacus).



3 Chinchilla, woolly-haired Mouse of Chile and Peru.



4 Spotted Cory of South America, resembling the Guinea-pig.



5 Marmot, or Mountain-rat



## Rocroi

Park is formed by the San Juan Range with at least a dozen peaks over 14,000 ft., and between one and two hundred above 13,000 ft. On the northeastern side this park is bounded by the Sangre de Cristo Range, in which is Blanca Peak (14,464 ft.). The Uintah Range, directly west of North Park, has several points above 13,000 ft.; and the Wahsatch Range, which forms the western limit of the southern division of the Rocky Mountains, rises to a height of 12,000 ft. just east of Salt Lake City. The northern division of the Rocky Mountains, with the exception of the Wind River Range and the Yellowstone region, is lower and has less impressive scenery than the southern. In Idaho and Montana the groups are more irregular in outline than in the south, and the division into ranges more uncertain. Of these the Bitter Root Mountains in part of their course form the divide between the Missouri and the Columbia. There two ranges reach altitudes of upward of 9,000 ft., and are crossed by a number of passes at elevations of from 5,500 to 6,500 ft. The Northern Pacific Railway crosses at Mullan's Pass (5,548 ft.) through a tunnel 3,850 ft. long. The Crazy Mountains, north of the Yellowstone, reach a height of 11,000 ft.; other groups are the Big Horn Mountains, and the Black Hills, whose highest point is Mount Harvey (9,700 ft.). In Canada the highest known peaks are Mount Brown (16,000 ft.) and Mount Hooker (15,650 ft.), lying about 53° n. lat.; the general altitude of this part of the range varying from 10,000 to 14,000 ft. The pass leading between Mount Brown and Mount Hooker, called the Athabasca Portage, has a height of 7,300 ft. The Rocky Mountains contain some of the finest scenery in the world, and are specially rich in deposits of gold, silver, iron, copper, etc., which are worked extensively.

**Rocroi** (or Rocroy) (rok-rwä), a small fortified town of France, dep. Ardennes, near the Belgian frontier, celebrated for the victory gained (1643) by the Duke d'Enghien (afterward the great Condé) over the Spaniards. Pop. 2,900.

**Roden'tia** (or Rodents), comprising the gnawing animals, such as rats, mice, squirrels, rabbits, etc. They are distinguished by the following characteristics: the teeth are limited to molars and incisors, canines being entirely absent; the molars have tuberculated or flat-tish crowns, and are especially adapted for the attrition of food; the incisors are long, and spring from permanent pulps, thus being continually reproduced and shoved outward from their bases. In the typical species the outer faces of the incisors are covered with hard enamel, but not the inner ones, hence the latter are soft and wear away faster than the anterior surfaces, thus keeping a sharp edge on the teeth. The digits are generally four or five in number, and are provided with claws. The intestine is long, and the cæcum generally large. The brain is almost destitute of convolutions. The eyes are placed laterally. The rodentia are divided into two main divisions or suborders, represented by mice, rats, squir-

rels, marmots, beavers, porcupines, etc., having the incisors strictly limited to two in each jaw; and the second, comprehending hares and rabbits, distinguished by four incisors in the upper jaw and two in the lower.

**Roderick**, last of the Visigoth kings of Spain, an almost legendary personage. On the deposition of King Witiza in 710 he was elevated to the throne. Shortly after his reign began, a conspiracy was formed against him by the sons of Witiza and others, including Count Julian, governor of Ceuta, who invited Musa, the leader of the Moors in North Africa, to assist them. Roderick met them at Xeres de la Frontera, where he was completely defeated with heavy loss, being killed in the battle. His fate is the theme of several old Spanish romances, and of poems by Scott and Southey.

**Rodney**, GEORGE BRYDGES (Baron Rodney) (1718-1792), British naval hero, b. in 1718 at Walton-upon-Thames. He became a lieutenant in the navy in 1739, first obtained a ship in 1742, and in 1749 went to Newfoundland as governor. On his return in 1752 he was elected member of Parliament for Saltash. In 1759, having been promoted to the rank of admiral, he bombarded Havre de Grâce in face of the French fleet. In 1762 he reduced Martinique, and on his return was rewarded with a baronetcy. In 1779 he was appointed to the chief command on the West India station, and in 1780 completely defeated a Spanish fleet off Cape St. Vincent. In 1782 he obtained a decisive victory over the French fleet under De Grasse.

**Rodos'to**, a town of Turkey in Europe, on the north shore of the Sea of Marmora. The environs are covered with vineyards, producing an excellent wine. Pop. about 20,000.

**Roe**, EDWARD PAYSON (1838-1888), American novelist, was b. in New Windsor, New York. On the completion of his theological studies he became a chaplain in the volunteer service (1862-65), and afterward pastor of a Presbyterian church at Highland Falls. The great Chicago fire of 1871 furnished him with a subject for his first novel, *Barriers Burned Away* (1872), which proved very successful. He resigned his pastorate and settled at Cornwall-on-the-Hudson in 1874, where he devoted himself to literature and the successful cultivation of small fruits. Fifteen novels came from his pen, all of which have been reprinted in Great Britain, and have been widely read on both sides of the Atlantic. The best known are *From Jest to Earnest* (1875), *Near to Nature's Heart* (1876), *Nature's Serial Story* (1884), and *He Fell in Love with his Wife* (1886). He is also the author of *Play and Profit in My Garden* (1873), and *Success with Small Fruits* (1880).

**Roebuck** (Roe-deer), a European deer of small size, the adult measuring about 2 ft. at the shoulders. The horns or antlers are small, and provided with three short branches only. The general body color is brown, whitish beneath. These animals inhabit mountainous and wooded districts. When irritated or alarmed they may prove very dangerous ad-

## Roebuck





1. Rabbit (*Lepus timidatus*).



2. Species of Porcupine (*Cercolabes prehensilis*).



3. Common Porcupine (*Hystrix cristatus*).



4. Blind Mouse (*Spalax typhlus*).



5. Swamp Beaver (*Myopotamus coypus*).



## Roentgen

versaries, and are able to inflict severe wounds with their antlers.



Roebuck.

**Roentgen**, WILLIAM C., b. in Holland in 1845. He was educated at the University of Zurich, and became professor of mathematics and physics in the Agricultural Academy of Hohenheim in 1875. In 1876 went to Strasburg University, and in 1879 he became director of the University and Institute of Physics at Gies-sen; he went to Wurzburg in Bavaria, in 1888 as professor of physics. In 1895, he announced the discovery of the Roentgen, or X-Ray.

**Roentgen Ray**. See *Electricity*. (Sub-head, *X-Rays*).

**Rogation Days** (Lat. *rogatio*, a request), the Monday, Tuesday, and Wednesday before Holy Thursday or Ascension Day, so called from the supplications or litanies which were appointed in the Roman Catholic Church to be sung or recited in public procession by the clergy and people. In England, after the Reformation, this practise was discontinued, but it survives in the custom (observed in some places) of perambulating the parish boundaries.

**Rogers**, HENRY WADE, b. in New York in 1853. He was graduated from the University of Michigan at the age of 21. He was admitted to the bar in 1877, and was a member of the law faculty of the University of Michigan in 1883. Two years later he was made dean of the law school. In 1890 he was chosen president of Northwestern University, but resigned in 1900, going to Yale. He has written several books, among which are, *Expert Testimony*, and *Illinois Citations*. He edited the *American Law Register* 1887-89.

**Rogers**, SAMUEL (1763-1855), English poet, b. at Stoke-Newington, London. After completing his attendance at school, young Rogers entered the banking establishment as a clerk, but his favorite pursuits were poetry and literature. His first appearance before the public was in 1786, when he gave to the world his *Ode to Superstition*, and *Other Poems*. The *Pleasures of Memory*, with which his name is principally identified, appeared in 1792, and *An Epistle to a Friend* (1798). In 1812 he published *The Voyage of Columbus*, a fragment; in 1814, *Jacqueline*, a tale; in 1819, *Human Life*; and in 1822, *Italy*, a descriptive poem in blank verse.

**Rog' geveld Mountains**, a range in the southwestern division of Cape Colony, running n.w. to s.e., with an average height of 5,000 ft.

## Roland

**Rogue**, in law, a vagrant or vagabond. Persons of this character were, by the ancient laws of England, to be punished by whipping and having the ear bored with a hot iron. The term *rogues* and *vagabonds* is given to various definite classes of persons, such as fortune-tellers, persons collecting alms under false pretenses, persons deserting their families and leaving them chargeable to the parish, persons wandering about as vagrants without visible means of subsistence, persons found on any premises for an unlawful purpose, and others. Rogues and vagabonds may be summarily committed to prison for one month with hard labor.

**Rohan** (rō-āp), HENRI, DUKE OF (1579-1639), French Protestant leader. In his sixteenth year he joined the court of Henry IV, and after the death of the latter in 1610 became chief of the Huguenots. After the fall of Rochelle (1628), and the peace of 1629, Rohan withdrew from France, and in exile wrote his *Mémoires sur les Choses advenues en France depuis la mort de Henry IV* (Paris, 1630). He commanded the Venetian troops against Austria until the Peace of Cherasco in 1631. In 1633 he joined the Protestant army on the Rhine, and died of wounds received at the battle of Rheinfelden on April 13, 1639. He was the author of *Mémoires sur la Guerre de la Vallée* (1638), *Les Intérêts des Princes* (1649), and *Discours Politiques* (1693).

**Rohilkhand** (or Rohilkund), a division of British India, N. W. Provinces; area 10,885 sq. mi.; pop. 5,122,537. The surface is a plain, with a gradual slope south, in which direction its principal streams, Ramganga, Deoha, and others, flow to the Ganges. It takes its name from the Rohillas, an Afghan tribe, who gained possession of it early in the eighteenth century. It is subdivided into the districts Bijnur, Muradabad, Budaon, Bareilly, Terai, and Shahjahanpur. It encloses the native principality of Rampur.

**Rohlfs** (rōlfs), FRIEDRICH GERHARD (1831- ), a celebrated African traveler, b. at Vegesack, Germany. He studied medicine, and in 1855-60 he served with the French in Algiers as surgeon in the foreign legion. In 1860 he traveled through Morocco, and explored the Tafilet Oasis in 1862. In 1863, and again in 1865, he traveled in North Africa. He joined the English Abyssinian expedition in 1867. In 1868 he traveled in Cyrenaica, and in 1873-74 he conducted an expedition through the Libyan Desert. He traveled across North America in 1875-76, and in 1878 he undertook a new journey to Africa, and penetrated to the Kufra Oasis. In 1880 he visited Abyssinia. He was appointed German general-consul at Zanzibar in 1884, and returned to Germany in 1885. His works include, among others, *Journey through Morocco* (1869), *Land and People of Africa* (1870), *Across Africa* (1874-75), *Journey from Tripoli to the Kufra Oasis* (1881), *My Mission to Abyssinia* (1883).

**Roland** (or Orlando), a celebrated hero of the romances of chivalry, and one of the paladins of Charlemagne, of whom he is represented as the nephew. His character is that

## Rollin

of a brave, unsuspicious, and loyal warrior, but somewhat simple in his disposition. According to the *Song of Roland*, an old French epic, he was killed at the battle of Roncesvalles after a desperate struggle with the Saracens, who had attacked Charlemagne's rear-guard. The celebrated Romantic epics of Boiardo (*Orlando Innamorato*) and Ariosto (*Orlando Furioso*) relate to Roland and his exploits.

**Rollin** (rol-an), CHARLES (1661-1741), a French historian, b. at Paris, studied theology, obtained a chair in the Collège de France, and latterly was a rector of the University of Paris. His *Ancient History* was long popular in English, but is now quite out of date.

**Rolling-mill**, a combination of machinery used in the manufacture of malleable iron, and other metals of the same nature. It consists of one or more pairs of iron rollers, whose surfaces are made to revolve nearly in contact with each other, while the heated metal is passed between them, and thereby subjected to a strong pressure. The first rolling is to expel the scoriæ and other impurities, after which the mass of metal is cut into suitable lengths, which are piled on one another and reheated, when the mass which has been partially fused is again passed through the rollers. This second rolling determines its form into a hoop, rail, bar, or plate, according to the form given to the surface of the rollers.

**Roman Architecture**, the style of building practised by the ancient Romans. Derived on the one hand from the Etruscans, and on the other from the Greeks, the fusion ultimately resulted in an independent style. Its essential characteristics are, the employment of the Tuscan and the composite order, and the introduction and free use of the semicircular arch and arcade, together with the use of rounded and prominent moldings, often profusely decorated. In Roman architecture the great feature is the employment of the arch as well as the lintel, while Greek architecture employs the lintel only. It produced various constructions, unknown to Greek art, such as amphitheatres, circuses, aqueducts, bridges, baths, triumphal arches, etc. It has thus been of vastly greater practical utility than the Greek, and is bold and imposing in appearance. The column as a support, being no longer exclusively a necessity, was often of a purely decorative character, and was largely used in front of closed walls, in domes above circular interiors, and in the construction of cylindrical and groined vaulting over oblong spaces. The arch was freely used internally as well as externally, and became an important decorative feature of interiors. The Roman temples, as a rule, from the similarity of the theogony to that of the Greeks, were disposed after the Greek form, but a purely Roman type is seen in the circular temples such as the Pantheon at Rome, the temple of the Sibyl at Tivoli, the temple of Vesta at Rome, etc. This style of architecture was introduced by the Romans into all their colonies and provinces—vast existing remains evidencing the solid character of the buildings. It reached

## Roman Catholic Church

its highest stage during the reign of Augustus (B.C. 27), and after the translation of the seat of empire to Byzantium it degenerated and ultimately gave place to a debased style.

**Roman Catholic Church**, that body of Christians which accepts the Pope as its visible head. Roman Catholics believe that the Church was established by Jesus Christ and committed to St. Peter as the chief of the Apostles, to whom he gave the keys of the Kingdom of Heaven. They believe it to be the only Church of Christ, beyond whose pale there is no salvation. The word *pale*, however, according to Roman theology, includes those of other Christian churches who understand and live in accordance with the precepts and teachings of Christ. The power bestowed by Christ upon St. Peter is believed by Catholics to descend to his successors to the end of time and is vested in the Pope as High Pontiff of the Church. The Creed or belief of Catholics is defined in the Apostles' Creed, the Nicene, Athanasian, and most minutely in that of Pius IV after the proclamation of the Council of Trent in 1562. The Church has seven sacraments which are believed to impart spiritual grace, three of which can be only once availed of: Baptism, Confirmation and Holy Orders. The ceremonial of the mass is regarded as the most sacred and solemn in the ritual of the Church. In it Catholics believe that the body, blood, soul and divinity of Jesus Christ are really present in the material elements of bread and wine. That form of worship is maintained by Catholics to have been ordained by Christ at his Last Supper with his Apostles, and has continued to the present time.

Catholics believe that Mary, the mother of Christ, can obtain for them innumerable spiritual benefits if they appeal to her. They believe that in her conception she was immaculate. Notwithstanding the fact that divine worship is denied to her, she is honored beyond any of the other saints. Her invocation and that of the other saints is prescribed in the Creed of Pius IV, which also imposes reverence for images of them, such as statues or pictures. After the Virgin Mary, St. Joseph is the most honored of all the saints.

A place of purification after death, known as purgatory, is also believed in by members of the Roman Church. Those dying penitent but not wholly cleansed from sin are believed to make full atonement in purgatory, after which they are admitted into heaven.

The definition of the Church, as understood by Catholics, is a congregation of all the faithful under the supremacy of the Pope, who has been pronounced infallible. His infallibility, however, is limited to questions of doctrine and faith which have been or would be defined by councils of the Church composed of cardinals and other ecclesiastical hierarchs.

All entering the priesthood must assume the vow of celibacy before admission to Holy Orders, according to the law of the Western Church. There is, however, no apostolic obligation on the Church to impose celibacy as an indispensable qualification for the priesthood.

## Romance

It is, however, regarded as an important quality, since those in a married state would not give their attention wholly to spiritual duties. Gregory the Great and the Council of Toledo in 653 prohibited marriage by those in Holy Orders. Persons in minor orders, though married, were for centuries allowed to serve the Church. In the twelfth century minor priests at marriage were deprived of clerical privileges. Boniface VIII in 1300 permitted them to act as clerks, provided they had the sanction of the Bishop. The Council of Trent subsequently pronounced such marriages null and void. In the East at the time of Socrates clerical celibacy obtained in Thessaly, Achaia and Macedonia. When Synesius in 410 was elected Bishop of Rome, he only accepted the office on the condition that he be allowed to live with his wife. The consequences of various laws on the question are: That Greeks who aspire to the priesthood leave the seminaries and return for ordination after marriage; that secular priests can live in the married state, but on the death of a wife cannot take a second; and that bishops are chosen from the monks. All monks and nuns must be celibates.

**Romance**, a fictitious narrative in prose or verse, the interest of which turns upon incidents either marvelous or uncommon. The name is derived from the class of languages in which such narratives in modern times were first widely known and circulated; these were the French, Italian, and Spanish, called the *Romance Languages*. The earlier mediæval romances of Western Europe were metrical, and may be divided into two classes—the popular epics chanted by strolling minstrels, and the more elaborate and artificial poems composed and sung by the court poets. Both classes were based on more ancient lays treating of celebrated heroes, frequently mingled with pagan myths, and with connecting passages composed by the reciters. Hence originated a series of epics grouped around some renowned hero, and forming a cycle of romance. The romances of French origin form a large and interesting body of literature. Some of them reach a greater length than 20,000 lines. These romances were sung by wandering minstrels to the sound of a kind of violin. Many of the reciters wrote their own chansons, while others bought copies from the original composers. The romances of the Arthurian cycle owe their origin to the lays of the Welsh bards, supposed to be as old as the sixth and seventh centuries, but they are directly based on the *Latin History of Geoffrey of Monmouth*, which was versified in French by Wace (1155-58) and amplified and translated into English by Layamon about 1204. A poem belonging to this cycle is the *Morte Arthur* (fourteenth century). The Arthurian romance spread from France to Provence, Spain, Italy, and the Netherlands, and was again transplanted into England. The most important romance of the classical cycle is *Le Romans d'Alixandre*, written by Lambert li Tors and Alixander de Bernay in the twelfth century; it contains upward of 20,000 twelve-syllable lines. This chanson first brought the

## Romanesque Architecture

Alexandrine line into vogue and gave it its name. The English *Kyng Alisaunder*, in 8,034 eight-syllable lines, dates from the fourteenth century. Besides the romances dealing with the subjects mentioned, we find also a class in which exploits of Teutonic heroes are celebrated, as the Anglo-Saxon or Anglo-Danish *Beowulf*, the old German *Nibelungentied*, the romance of *Havelok the Dane*, etc. The poetical romance was superseded by the prose romance, the transformation of metrical into prose romances being partly due to the invention of the art of printing, by which the advantage of metre for purposes of recital was superseded. The prose narratives, like those in verse, celebrated Arthur, Charlemagne, Amadis de Gaul, and other heroes of chivalry.

**Romance Languages**, those languages of Southern Europe which owe their origin to the language of Rome—the Latin—and to the spread of Roman dominion and civilization. They include the Italian, French, Provençal, Spanish, Portuguese, Roumanian, and Romansch. Their basis was not, however, the classic Latin of literature, but the popular Roman language—the *Lingua Romana rustica* spoken by the Roman soldiers, colonists, and others, and variously modified by uneducated speakers of the different peoples among whom it became the general means of communication. In all of these tongues Latin is the chief ingredient, and a knowledge of Latin helps very greatly in mastering them.

**Romanesque Architecture**, a general and rather vague term applied to the styles of architecture which prevailed in Western Europe from the fifth to the twelfth century. The Romanesque may be separated into two divisions: (a) the debased Roman, in use from the fifth to the eighth century; and (b) the later Romanesque of the eighth to the twelfth century, which comprises the Lombard, Rhenish or German, and Norman styles. The former is characterized by a pretty close imitation of the features of Roman, with changes in the mode of their application and distribution; the latter, while based on Roman form, is Gothic in spirit, has a predominance of vertical lines, and introduces a number of new features and greatly modifies others. To the former belong especially churches of the basilica type in various cities of Italy, as also a number of circular churches, and many of these buildings have a certain affinity to the Byzantine type of architecture. The semi-circular arch is used throughout the entire period, and the general expression of the buildings is rather severe. It assumes different phases in different countries. In Romanesque churches of the ninth and the eleventh century the prevailing features are, that in plan the upper limb of the cross is short and terminated by a semi-circular or semi-octagonal apse; the transepts frequently short, and often rounded externally; the walls very thick, without buttresses or with buttresses having very slight projection; the pillars thick, sometimes simply cylindrical or clustered in large masses, and either plain or with but simple decora-



L. 1. 14  
 25. 12  
 L. 1. 14



COSTUMES OF THE ROMANS AND OTHER ANCIENT PEOPLES. 1. Egyptian Woman in the Kalsiris. 2. Egyptian with Apron and Sphinx-cap. 3. Greek with Clamis (kind of Cloak). 4. Greek Woman in the Diploidion. 5. Greek Woman in the Chiton (an under-garment) and the Kimation. 6. Roman with the Toga. 7. Roman Lictor with the Sagum (military cloak). 8. Roman Woman with the Tunica and Pallia. 9. Roman Peasant with Panula.

on; the capitals of cushion form, sometimes plain, at others enriched with various ornaments peculiar to the style. Externally, roofs of moderate pitch, towers square or octagonal, towers of moderate elevation, and with terminations of pyramidal character; windows rounded and without mullions; doorways moderately recessed and highly decorated with the pilaster, chevron, and other distinctive ornaments; arcades much employed for decoration, frequently by a continuous series round the upper part of the apse and round the upper ends of transepts also, when the transepts are rounded externally. The principal front is frequently flat and decorated with arcades in successive rows from the apex of the roof till just above the porticoes, producing a rich effect, as at Pisa Cathedral.

**Roman Law.** See *Civil Law*.

**Roman Literature.** See *Rome*.

**Romans.** FIRSTLY TO THE, the most elaborate, and, in a doctrinal point of view, the most important composition of St. Paul. It is worth that the gospel doctrine of justification by faith is a power unto salvation to all men, both Jews and Gentiles. The writer then deprecates the rejection of the Jews, and in a practical part admonishes the Romans to receive the various gifts bestowed upon each in a spirit of love and humility. He especially urges the strong to bear with the weak, and concludes with various salutations and directions.

**Romantic**, a term used in literature, is distinguished to *antique* or *classical*. The name *romantic school* was assumed about the beginning of the nineteenth century by a number of young poets and critics in Germany, the Schlegels, Novalis, Tieck, etc., whose efforts were directed to the overthrow of the artificial rhetoric and unimaginative banality of the French school of poetry. The name is also given to a similar school which arose in France between twenty and thirty years later, and which had a long struggle for supremacy with the *old classical school*; Victor Hugo, Lamartine, etc., were the leaders.

**Roman Walls**, certain of the ramparts in Britain constructed by the Romans. The most celebrated of these is the wall built by Hadrian (120 A.D.) between the Tyne and the Solway. It was further strengthened by Severus, and is often called the wall of Severus. In 139 Lollius Urbicus built a second wall or northern rampart between the Forth and the Clyde, which occupied the same line as the chain of forts built by Agricola (A.D. 80-85), and was known as the wall of Antoninus. These walls formed the northern boundaries of the Roman dominions in Britain, and were built to prevent the incursions of the Picts and Scots.

**Rome** (Ancient), a great nation of Southern Europe, at various times a kingdom, a republic, and an empire, whose historical existence covers the period 753 B.C. to 476 A.D., or about 1,230 years. The history of ancient Rome, from its legendary beginning to the fall of the empire, centers about the capital city, which constituted all that was significant, politically

or socially, in the life and development of the nation. Little after the fall of the empire, the ancient world was divided into two parts, the *Eternal City* stood as a monument to the past, and in later centuries, the city was the vast ecclesiastical center of the Catholic Church. The city was the capital of the Roman Empire, and the center of the world.

Rome, in its history, was a city of great power and influence. It was the center of the world, and the capital of the Roman Empire. The city was the center of the world, and the capital of the Roman Empire. The city was the center of the world, and the capital of the Roman Empire.

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COSTUMES OF THE ROMANS AND OTHER ANCIENT PEOPLES. 1. Egyptian Woman in the Kalsiris. 2. Egyptian Woman in the Chiton (an under-garment) and the Kimation. 3. Greek with Clamis (kind of cloak). 4. Greek Woman in the Diplidion. 5. Greek Woman in the Tunic and Palla. 6. Roman with the Toga. 7. Roman Lictor with the Sagum (military cloak). 8. Roman Woman with the Tunic and Palla. 9. Roman Pessant with Panula.

## Roman Law

tion; the capitals of cushion form, sometimes plain, at others enriched with various ornaments peculiar to the style. Externally, roofs of moderate pitch, towers square or octagonal, low or of moderate elevation, and with terminations of pyramidal character; windows round-headed and without mullions; doorways moderately recessed and highly decorated with the cable, chevron, and other distinctive ornaments; arcades much employed for decoration, frequently by a continuous series round the upper part of the apse and round the upper parts of transepts also, when the transepts are rounded externally. The principal front is frequently flat and decorated with arcades in successive rows from the apex of the roof till just above the portals, producing a rich effect, as at Pisa Cathedral.

**Roman Law.** See *Civil Law*.

**Roman Literature.** See *Rome*.

**Romans**, EPISTLE TO THE, the most elaborate, and, in a doctrinal point of view, the most important composition of St. Paul. It sets forth that the gospel doctrine of justification by faith is a power unto salvation to all men, both Jews and Gentiles. The writer then deplores the rejection of the Jews, and in the practical part admonishes the Romans to exercise the various gifts bestowed upon each in a spirit of love and humility; he especially urges the strong to bear with the weak, and concludes with various salutations and directions.

**Romantic**, a term used in literature, as contradistinguished to *antique* or *classic*. The name *romantic school* was assumed about the beginning of the nineteenth century by a number of young poets and critics in Germany, the Schlegels, Novalis, Tieck, etc., whose efforts were directed to the overthrow of the artificial rhetoric and unimaginative pedantry of the French school of poetry. The name is also given to a similar school which arose in France between twenty and thirty years later, and which had a long struggle for supremacy with the older *classic school*; Victor Hugo, Lamartine, etc., were the leaders.

**Roman Walls**, certain walls or ramparts in Britain constructed by the Romans. The most celebrated of these is the wall built by Hadrian (120 A.D.) between the Tyne and the Solway. It was further strengthened by Severus, and is often called the wall of Severus. In 139 Lollius Urbicus built a second wall or northern rampart between the Forth and the Clyde, which occupied the same line as the chain of forts built by Agricola (A.D. 80-85). It is known as the wall of Antoninus. These walls formed the northern boundaries of the Roman dominions in Britain, and were built to prevent the incursions of the Picts and Scots.

**Rome** (Ancient), a great nation of Southern Europe, at various times a kingdom, a republic, and an empire, whose historical existence covers the period 753 B.C. to 476 A.D., or about 1,230 years. The history of ancient Rome, from its legendary beginning to the fall of the empire, centers about the capital city, which constituted all that was significant, politically

## Rome

or socially, in the life and fortunes of the nation. Long after the greatest empire of the ancient world had crumbled into decay, the *Eternal City* stood as a monument of its glory; and in later centuries it became the capital of the vast ecclesiastical empire of the Roman Catholic Church. Since 1871 Rome has been the capital of the kingdom of Italy.

Roman history may be divided into three periods: 1, the Kingdom, 753 (?)–509 B.C.; 2, the Republic, 509–31 B.C.; 3, the Empire, 31 B.C.–476 A.D. The third period falls naturally into (a) the rise and ascendancy of the empire, 31 B.C.–169 A.D.; (b) the decline and fall of the Roman Empire in the West, 169–476 A.D. The origin and early history of Rome are lost in antiquity, and the legendary accounts preserved have probably little that is authentic. Respecting the foundation of Rome more than twenty different accounts existed, of which the one most in favor with the Romans themselves traced it back to a colony of fugitive Trojans. This legends tells how Æneas, after the destruction of Troy by the Greeks, fled with a few friends and finally landed in Italy, where he was kindly received by King Latinus, who gave him in marriage his daughter Lavinia. In her honor the town built by Æneas was called Lavinium. His son, Ascanius, built a new city, *Alba Longa*. The line of kings continued until Numitor, who was deposed by his younger brother, Amulius. Numitor's daughter, Rhea Silvia, had been made a vestal virgin by the king, but bore to the god Mars the twins, Romulus and Remus. Although thrown into the Tiber, the children were miraculously preserved and nurtured until cared for by a shepherd. As men they accidentally discovered their origin, and restored their grandfather to the throne. The brothers resolved to found a new city on the banks of the Tiber, where they had been reared. In the quarrel respecting the naming and government of the city Remus was slain by his brother, who became the first king of Rome, 753 A.D. To hasten the growth of his new city Romulus made it a place of refuge to which he invited the lawless and discontented from the surrounding country. Neighboring cities refusing to marry their daughters to his subjects, Romulus by subterfuge secured for them Sabine wives. The *Rape of the Sabines* led to war with that people. It was ended by the intercession of the Sabine women, who reconciled their husbands and fathers. The Romans and the Sabines were then united into a single nation, the former occupying the Palatine Hill, as before, the latter the Quirinal. Romulus is said to have divided his people into patricians and clients; the former was divided into three tribes, and these again into *curiæ*, for the enactment and administration of laws. Romulus was removed by a miraculous death after a reign of 37 years. Whatever the truth of the legendary incidents, the background of facts is assured on the basis of ethnological, archaeological, and philological investigation.

In prehistoric Italy there were three races, probably of nearly related ancestry, the Etrus-



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can, Iapygian, and Italian. Of the several branches of the last named, the Latins were most important and had progressed farthest in civilization. The smallest units in their society were the households; these were united by relationship or locality into clans, which in turn formed communities and cantons. The Latin cantons formed what was known as the League of the Thirty Latin Cities, at the head of which was *Alba Longa*. Three cantons situated on the hills of the Tiber, the Ramnians (afterward Romans), the Titians, and the Luceres combined for mutual protection and finally formed the Roman commonwealth. The isolated cities of Latium were subdued, one after another, and the inhabitants moved to Rome. These people became the *plebeians* of Rome and were without political rights, while the three original tribes, representing the Latin, the Sabine, and the Etruscan elements respectively, constituted the *patrician* class, in whom all rights of government were vested. At the head of the government was the king, who was elected by the people. He was commander of the army, chief judge, and had absolute power as to life and death. Next to him was the senate, composed of 300 members, one from each of the households that made up the Roman state. It was simply an advisory body, having no power to enact laws. The popular assembly included the heads of all the families; its function was to enact laws, determine upon peace and war, and confirm the election of the king. According to the accepted chronology of the Roman Kingdom, largely conjectural with respect to the first four, the rulers were as follows: Romulus, 753-716; Numa Pompilius, 715-672; Tullus Hostilius, 672-640; Ancus Martius, 640-616; Tarquinius Priscus, 616-578; Servius Tullius, 578-534; Tarquinius Superbus, 534-509. The period of the kings was occupied with contests between the patricians and the plebeians, as a result of which the latter, in the reign of Tarquinius Priscus (the Elder), who founded the Etruscan dynasty, gained certain privileges. His successor, Servius Tullius, incorporated the plebeians into the state, and made wealth, instead of birth, the basis of taxation and military service. This ended the monopoly of power by the patricians and laid the foundations for the great civil and military power of the Roman state. By the Servian constitution the king's power was carefully restricted, and therefore when Tarquinius Superbus (the Proud) exceeded his powers and tried to oppress the great houses, they rose in a body and dethroned him, declaring that henceforth the supreme power should be held by no one for life, but should be held by themselves in turn. At the head of the new government, the republic, were two magistrates called consuls, chosen for one year and possessing equal power, each being unable to act without the consent of the other. The consuls possessed nearly all the powers formerly exercised by the king. The first two or three hundred years of the Roman Republic are marked by bitter contests between the patricians and the plebeians, and

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between rich and poor. Various laws relating to rates of interest and usury were enacted for the protection of the poor, and their condition was much improved by the various colonies established to secure Roman sovereignty in Italy. The first step toward political equality and protection for the plebeians against the patricians was the creation of the office of tribune, 494.

The frequent wars and general disorder which followed the expulsion of Tarquin incurred large expenses, the burden of which fell upon the plebeians. By the severe laws of debt, a patrician might imprison, sell as a slave, or even put to death a plebeian indebted to him. The plebeians, who had no voice in the management of these expensive wars, at last refused to do military service, and marched away in a body to found a new city (494 B.C.). They were induced to return only on condition that old debts be canceled and that two magistrates, called tribunes, be elected from the commons, whose duties should be to protect plebeians against unjust exercise of consular authority. From the rights of intercession was developed the power to veto any consular measure which seemed contrary to the interests of plebeians. The establishment of the tribunes was, then, the first of the limitations placed upon the hitherto absolute authority of the consuls, and began the series of reforms which finally made Rome a democracy in fact as well as in name. The powers of the tribunes developed rapidly. They soon usurped the right to punish a patrician proved to have attempted a violation of plebeian privileges. Such was the case of Coriolanus (491 B.C.). The *Agrarian Law* of Cassius (486), passed after great strife but never executed, provided for the distribution of public lands among the plebeians and Latins. By the *Publikian Law* of Volero (471) the election of the tribunes was transferred to the plebeians exclusively, the patricians having no longer any part in it. The number of tribunes was increased to five and afterward (457) to ten. The plebeians having demanded that the laws, hitherto held and interpreted solely by the governing patrician class, be written and published, a commission was appointed to examine Greek laws; and to prepare a code, ten magistrates, decemvirs, were elected. They were also for the time being to administer the entire government, the offices of consul and tribune being temporarily suspended. The final result of their deliberations was the *Twelve Tables of Laws*, upon which all subsequent Roman jurisprudence was based (451 B.C.). To complete the business on hand, a second board of decemvirs was elected. Under the leadership of Appius Claudius, the only member of the first board re-elected, the second decemvirate began a veritable reign of terror, marked by every excess of tyranny and outrage. The attempted crime of Appius Claudius against the plebeian maiden Virginia, brought about the overthrow of the decemvirs. The contest of the plebeians for admission to the consular office was renewed, and resulted in a compro-



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mise, the election of military tribunes with consular power (445), who might be from either order. What the plebeians gained from this reform was partly annulled by the creation of two patrician magistrates called censors, who were next in dignity to consuls and controlled matters of the census, finance, and public works. Quæstors were first elected in 447, and in 421 the number was increased from two to four; two might be plebeians. The first plebeian consul was Lucius Sextius (336), the *Licinian Law* having declared that henceforth consuls and not military tribunes should be elected, and of the two consuls one must be a plebeian. To offset this advantage, the patricians secured the new office of prætor, a magistrate who was to exercise the judicial duties of the consuls. The prætorship was soon open to the plebeians, so that henceforth the *populus Romanus* embraced both plebeians and patricians. The renewed attempt of the latter to obtain full power resulted in the mutiny of 342 B.C., after which both consuls might be plebeians, and one of the censors must be (by the *Pubilian Laws* of 339).

The period during which the Roman Republic was passing through such important internal development, was marked by wars to recover the territory lost after the expulsion of Tarquin and to further extend her sovereignty. The neighboring tribes, having made treaties with the king, regarded their allegiance as ended by his expulsion, and consequently broke away from Rome. Certain Etruscan tribes and afterward Lars Porsenna of Clusium aided Tarquin in his attempts to recover the throne, as did later the thirty Latin cities under Octavius Mamilius of Tusculum. The Romans in 493 formed a league with the Latins and Hernicians. Chief of these wars with neighboring tribes were the one against Veii, the Volscian War, in which Coriolanus figures, and the Æquian wars, famed for the legend of Cincinnatus (458). In 390 B.C. the Gauls under Brennus invaded the Roman territory from Northern Italy. They defeated the Roman army at Allia, and captured the city without resistance, the inhabitants having nearly all fled. They plundered and burned the city, but failed to take the citadel, heroically defended by Manlius for seven months. Finally the news that the Venetians had invaded their territory induced the Gauls to withdraw from Rome, after receiving a ransom of one thousand pounds in gold. A less probable account represents that Brennus was finally defeated. Soon after the invasion of the Gauls, Rome was able to recover her former position in Latium, which she secured by a series of fortresses. The Tuscans were subdued and all Southern Etruria subjected to Roman sway. The Volscians and Æquians were also finally reduced (383). On her progress southward Rome came, at the River Liris, into collision with the powerful Samnites, and a contest for the mastery of Italy began which lasted nearly 50 years (343-295 B.C.), with occasional interruptions. Strengthened by the establishment of political equality and the consequent united

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action of her citizens, Rome felt she could safely undertake a war of conquest, and accordingly when opportunity offered to form an alliance with the Campanians, who were constantly harassed by the neighboring Samnites, she eagerly seized it. This alliance resulted in the First Samnite War (343-41). The Roman army gained some successes in the Campania, but a mutiny of the soldiers in the winter of 342 compelled them to withdraw. The Latin cities that had become a part of the Roman state now demanded a share in the spoils of war and in the government, but were refused. This led to the so-called Latin War (340-38), in which Rome formed an alliance with the Samnites and completely defeated the Latin League. Rome henceforth exercised absolute supremacy in Latium.

The Romans now established colonies in Campania, and on the land conquered by the Samnites. Two years later they attacked Palæopolis, an independent Greek city under Samnite protection, and the Second Samnite War (326-304) broke out. At first victorious, the Romans were defeated at Caudine Forks, 321; but after a delay caused by a revolt of the Etruscans, they finally captured the capital of Samnium, and peace was concluded. The Third Samnite War (298-295) was caused by the Samnites' interfering in the affairs of Lucania, an ally of Rome. Although opposed by the allied Samnites, Etruscans, and Umbrians, the Romans won the battle of Sentinum (295), and firmly established their supremacy over the Samnites. Rome's progress in the southeast was opposed by the Tarentines, who called to their aid Pyrrhus, king of Epirus, and the contest which followed is known as the War with Pyrrhus, 280-272 B.C. The Romans were defeated at Heraclea (280) and Asculum (279). Pyrrhus was now called to Sicily, and on his return was defeated at Beneventum (274), and compelled to leave Italy. Tarentum surrendered, and the supremacy of Rome in Southern Italy was secured. Rome next came into collision with Carthage, the most powerful foe she had yet encountered. The cause of dissension was the island of Sicily; separated from Italy by a narrow strait and distant, at its southern extremity only 70 mi. from Carthage. The Romans and Carthaginians had had a treaty of alliance since 348, which, however, was of little significance, and the progress southward of the former was viewed with jealous eyes. When the Mamertines, a plundering tribe of Sicily, about to be subdued by King Hiero of Syracuse, applied to Rome for aid, it was gladly given. Hiero and the Carthaginians, who had allied themselves with him to gain control of Sicily, were defeated by the Roman army near Syracuse (263), whereupon Hiero made an alliance with Rome, to which he remained faithful. This began the First Punic War (264-241 B.C.). Agrigentum was captured in 262, and the Romans were now masters of nearly all Sicily. To oppose the great naval power of Carthage a fleet was needed, and in the short space of 60 days the Romans launched

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120 ships. In 260 a great victory was won over the Carthaginian fleet off Mylæ. After subduing Corsica and Sardinia, the Carthaginians were driven to the western end of Sicily. The first attack on Carthaginian territory in Africa (256) was unsuccessful, and the fleet was destroyed by a storm. The Romans won a great victory at Panormus, in Sicily (250), but could not take Lilybæum and Drepana, which were defended by Hamilcar, the father of Hannibal. At the naval victory of the Romans at the Kegatian Islands (241), Carthage could raise no funds to continue the war, and peace was concluded on terms very advantageous to Rome. All Sicily, except the territory of Hiero, became a Roman province.

During the next 20 years both Rome and Carthage strengthened their resources and prepared for a renewal of the struggle. Rome wrested Corsica and Sardinia from Carthage and subdued the Gauls in Northern Italy (231-222). The loss of the Mediterranean islands was made good to Carthage by the new empire which Hamilcar established in Spain. The Second Punic War (218-202 B. C.) is inseparably connected with the name and the wonderful military career of Hannibal. In 219, having completed his preparations for war, Hannibal laid siege to Saguntum, an ally of Rome. The Carthaginian government refusing to deliver up Hannibal because of this act, Rome, as was expected, immediately declared war. Marching from Spain through Gaul, where his army was largely reinforced, Hannibal crossed the Alps and appeared on the plains of Po in the spring of 218. At the River Ticinus and afterward at the Trebia he defeated the Roman armies under Scipio. The next spring he crossed the Apennines, and near Lake Trasimenus inflicted a terrible defeat on the Romans led by the consul Flaminius. Hannibal pressed on to the Adriatic without opposition, the Roman commander, Fabius, avoiding an engagement. At the disastrous battle of Cannæ (216), the Roman army under Paulus and Varro was defeated with terrible slaughter. Many of the cities of Southern Italy joined Hannibal, among them the important town of Capua. Rome now equipped a large army, but for some time no decisive battle was fought. Meanwhile the two Scipios had marched into Spain to prevent Hannibal's brother, Hasdrubal, from reinforcing him. They won the battle of Ibera (215); took Saguntum, and prepared to invade Africa. Hasdrubal recovered some of the lost ground, and although the Romans captured New Carthage (207), they were defeated at Bécula the same year. Spain was not finally conquered until Hasdrubal left to reinforce his brother. In Sicily the Carthaginians had secured Syracuse after the death of Hiero, but after a two years' siege it fell into the hands of the Romans, together with all Sicily. Hannibal captured Tarentum in 212, but three years later it was retaken by the Romans. Capua was recovered, after a long struggle, in 211. Hannibal was now hard pressed and could make no headway. Had Carthage been able to send him aid when he

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asked it, the whole result of the war might have been changed. As it was, the long delay weakened Hannibal's army and strengthened the Romans. It was not until 207 that Hasdrubal crossed the Alps with the desired reinforcements. The consul Nero by a clever stratagem intercepted his dispatch to Hannibal, united his forces with the army in Northern Italy, and at the Metaurus gave Hasdrubal an overwhelming defeat (207). Hannibal now retired southward, where he remained until recalled in 203 to defend Carthage from the invading Romans.

In 204 Scipio, surnamed Africanus, because of his exploits beyond the Mediterranean, had landed near Utica, and at Zama, in 202, the final battle was fought. The Carthaginian army was annihilated, and the proud city was compelled to accept peace upon the most humiliating terms. She lost to Rome all her colonies, was required to pay a large annual tribute, and to surrender all her fleet except twenty vessels. The advantage to Rome of this war was enormous. Her power at home was greatly strengthened, and her dominions largely increased by the acquisition of the Carthaginian colonies. On the sea she became supreme. Rome's next wars of conquest were in the East, and began in consequence of the aid given to Hannibal by Philip, king of Macedonia, and this ruler's attacks on Egypt, Attalus, and Rhodes, who were friends and allies of Rome. The First Macedonian War was without results (214-205), Rome being then too busily engaged with Carthage; but the second (200-196) ended with the complete defeat of Philip at Cynoscephalæ. The Ætolians had been allies of Rome, but felt dissatisfied and attempted to revenge themselves with the aid of Antiochus of Syria. The latter crossed to Greece, but received a final defeat at Magnesia (190). Soon afterward Ætolia was subdued, and, like Macedonia, made tributary to Rome. In 171 the Greeks united under Perseus, the new king of Macedonia, and the Third Macedonian War followed. It was ended by the decisive victory of Pydna (168), from which time the universal dominion of Rome dates. The Achæan League having joined a revolt (147), Greece was quickly subdued and converted into a Roman province (146 B.C.). Previous to this the Greeks had been merely tributary, governing themselves. The splendid city of Corinth, a bitter commercial rival of Rome, was totally destroyed. The same year marks the close of the Third Punic War (149-146), which was merely the three years' siege and heroic defense of Carthage. In the words of Cato, Rome had resolved that "Carthage must be destroyed," and so completely was the resolve carried out that every trace of the once splendid city was obliterated, and its very site turned over by the plow. Africa became a Roman province. In Spain, an obstinate war had been carried on by the Celtiberians (154), but the country was finally subdued, the capture of Numantia (133) establishing Roman supremacy. The last century of the Roman Republic is marked by incessant and disastrous civil dissensions. In spite of

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the nominal equality in civil and political rights, the government was exclusively in the hands of the nobility, and the senate ruled with almost sovereign power. The lands had been absorbed in the great estates, and were tilled by slaves, of whom there had been a great number acquired in the Eastern wars; the inevitable result was misery for the native laboring classes. A certain class of slaves, however, proved a valuable acquisition to Rome; these were the Greeks of good birth and education who became teachers in Roman families. In consequence of large importations of corn from the East at a very small cost agriculture was neglected, and vast tracts of fertile grain lands were given over to pasturage. Agrarian laws for the relief of the poor were proposed by Tiberius Gracchus (133), tribune and champion of the people, but defeated. The enmity of the aristocracy, and his own high-handed measures in attempting to secure a re-election resulted in his murder, together with 300 of his followers (133). For the first time, but not the last, the Roman Forum was the scene of riot and bloodshed. His brother, Gaius Gracchus, attempted even wider reforms, but met a similar fate (121). The Gracchi are the most famous popular champions in Roman history.

From 121 to 70 B. C. the corrupt oligarchy ruled with absolute and shameless sway. So low had the honor of the Roman state sunk that when Jugurtha, king of Numidia, revolted and usurped neighboring territory under the Roman protectorate, the commissioners sent to investigate and the army dispatched to subdue him were readily won over to his side by bribes. And even when Jugurtha was brought to Rome, under promise of immunity, to testify against the corrupt officials, the latter bribed one of the tribunes to prohibit the hearing of his evidence. The Jugurthine War was finally ended by Caius Marius (106), who from the humblest origin had risen to the consulship. Rome was now threatened with a terrible danger from the North. Two migratory Germanic nations, the Cimbri and Teutones, had entered Northern Italy and driven the Gauls before them like sheep. Marius marched against the two invading tribes, who had separated. At Aquæ Sextiæ the Teutons were annihilated, 200,000 being slain (102 B. C.), and the next year at Vercellæ the Cimbri were defeated with awful slaughter; 100,000 were killed and 60,000 sold as slaves. Thus was destroyed the vanguard of the great Germanic migration; later tribes were destined to take ample revenge for their cruel fate. The most prominent figures in Rome during the next 25 years were Marius and the notorious Sulla, first his lieutenant but afterward his bitter enemy. Marius was the idol of Rome after his victories over Jugurtha and the Cimbri and Teutons, and was hailed as the "Savior of Italy." Six times he was consul, but though a great general, he was far from being a successful statesman. In 90 B. C. began a fierce struggle known as the Social War, in which the Latins and the various Italian peoples contended for the rights

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of Roman citizenship, which belonged only to the inhabitants of the capital and of Roman colonies. The life of the republic was endangered, and bravely the Romans fought to save it. Although generally victorious, Rome wisely ended the strife by granting the privileges demanded and relieving the *aliens* of cruel and unjust oppression and discriminating tyranny (88 B. C.). In the Social War Marius and Sulla, in spite of growing jealousies, fought side by side, but the latter won far greater renown than his rival. Consequently when a leader was selected to carry on the war against Mithridates, king of Pontus (88), Sulla was chosen. This was the signal for the shameful and bloody Civil War of Marius and Sulla. Marius succeeded by fraud and intimidation in having the command transferred to himself, but Sulla, who had not yet departed for the East, marched his army to Rome and expelled Marius and his followers. After a wonderful series of adventures the aged Marius found refuge on an island off the coast of Africa. As soon as Sulla had left Rome, Cinna collected the followers of Marius, who was recalled, and the two entered the capital, slew Sulla's friends by hundreds, and began a reign of terror, lasting until the death of Marius (86).

The First Mithridatic War (88-84 B. C.) was caused by the king's encroachments on Roman colonies in Asia Minor. Mithridates was exasperated by the conduct of the Roman commissioners. Finally he took up winter quarters at Ephesus and sent an army to aid the revolting Athenians. Sulla captured Athens and defeated the king at Chæronea (86) and Orchomenus (85). Mithridates was brought to terms. Sulla returned to Rome with his victorious army, slew the adherents of Marius and Cinna by thousands and confiscated whole cities and provinces for the use of his soldiers. By the famous "Proscriptions of Sulla" 47,000 persons are said to have perished. Julius Cæsar, then a lad of 18, narrowly escaped. Sulla was made dictator, and ruled until his abdication, 79 B. C. His death occurred the next year. He "reformed" the constitution, securing full power to the senate. A reaction against the laws of Sulla resulted in a war with Sertorius in Spain and the Gladiatorial War, in which 100,000 slaves, gladiators, and malcontents flocked to the standard of the famous Spartacus (73-71). This war was ended by two leaders who were to play foremost parts in the political drama of the next quarter-century, Pompey and Crassus. As a reward for their recent services they obtained the consulship (70). Pompey's next important service was his rapid and complete extermination of the Mediterranean pirates, who had harassed the coasts and menaced even Rome (67). The next year he took command against Mithridates, who had renewed the war (74), and defeated him at Nicopolis (66). Before returning to Rome, Pompey subdued Syria, Phœnicia, and Palestine, and took Jerusalem (63). At Rome the Conspiracy of Catiline was thwarted only by the genius and eloquence of Cicero (63-62 B. C.).

For the next twenty years the history of



## Rome

Rome is the biography of the men who, in 60 B. C., formed the famous First Triumvirate—Cæsar, Pompey, and Crassus. The combination was made solely to advance the interests of the three parties to the agreement. Pompey and Cæsar especially had objects to gain; the former wanted lands for his soldiers, the latter aspired to the consulship; their chief opponents were Cato and Cicero, the latter of whom was banished. This ring controlled politics absolutely, and had everything their own way. During Cæsar's absence on his famous War of Gallic Conquest (58–51 B. C.), Clodius did his bidding at Rome. Pompey and Crassus disagreed but were reconciled by Cæsar and a new triumvirate was formed (56). Crassus, while pro-consul of Syria, crossed the Euphrates to attack the Parthians, and was slain (53). Pompey's wife, Julia, the daughter of Cæsar, had died in 55, and with the death of Crassus the struggle between the two remaining members of the triumvirate for the supremacy became inevitable. Pompey formed a coalition with the senate, and was elected sole consul (52). Cæsar was ordered to disband his army and give up his province. The Great Civil War followed (49–45 B. C.). Cæsar hurried his army across the Rubicon, which marked the boundary between his province and Roman territory, and Pompey in consternation fled south to Brundisium (49). Cæsar defeated the Pompeian forces in all the provinces, and on the famous field of Pharsalia, in Thessaly, the decisive battle was fought (48 B. C.). Pompey fled to Egypt, where he was assassinated. The subjugation of Italy and the provinces was not completed until 45, when Cæsar returned to Rome and ruled as *Imperator*. He introduced many reforms and gave the country a most excellent government; his stupendous plans contemplated the conquest of all the known world. But, in spite of the woeful decay of the republic, Rome was not yet ready for the empire, and Cæsar fell by the daggers of the conspirators, led by Brutus and Cassius, on the Ides (15th) of March, 44 B. C. The assassins did not receive the approval they expected, and the power fell into the hands of Mark Antony, who pronounced the famous funeral oration upon Cæsar. He was checked by Octavius, the grand-nephew and legal heir of Cæsar, who won Cicero to his cause. A two years' struggle followed, which was ended by Octavius' securing the consulship (43). The Second Triumvirate was formed, consisting of Octavius, Antony, and Lepidus. The first basely sacrificed his friend Cicero under the agreement. Octavius and Antony crossed to Greece, and at Philippi (42 B. C.) defeated the last supporters of the republic. Brutus and Cassius both committed suicide.

A rupture between Octavius and Antony was narrowly avoided, but finally a division of the empire was made as follows: Octavius received the West, Antony the East, and Lepidus Africa. Antony and Lepidus quarreled respecting the sovereignty of Sicily, and the latter was expelled from the triumvirate. Antony visited Egypt for the purpose of calling to account

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the tributary queen Cleopatra, but under the charms of that arch enchantress he forgot his duty and his country. Only once did he tear himself away from his voluptuous surroundings long enough to make a disastrous expedition against the Parthians. The favorable opportunity to break with Antony was seized by Octavius, who attacked the joint fleets of Antony and Cleopatra at Actium, 31 B. C. The queen turned her galley about and fled in terror, and the faithful Antony followed, leaving his army to surrender. He prolonged the contest for a time, but finally, deserted by all, Cleopatra included, committed suicide. The queen tried in vain to use her wiles on Octavius, and finally died, it is believed, by her own hand. All rivals removed, Octavius was the sole ruler of the Roman world. He was prudent and cautious, and all his energies were directed toward acquiring supreme power while avoiding all title and semblance of the hated royalty. So well did he succeed that under republican forms he established an absolute and perfect monarchy. The senate was retained, consuls, tribunes, censors were chosen, but their functions were gradually entirely absorbed. In 30 B. C. Octavius received the title *Imperator*; the next year he was designated *Augustus*, a title then conferred for the first time, and under this name he is known in history. So wise was his rule, so beneficent his measures, and so welcome the peace and prosperity he restored, that Rome for the time being cared little whether she was ruled as a republic or an empire. From the year 31 B. C., therefore, is dated the beginning of the Roman Empire. Successful campaigns were carried on along the Rhine and the Danube. Several important provinces were added to the empire, chief of all was Egypt. The wars against the Gallic and Germanic tribes, begun by Cæsar, were carried on by Tiberius and Drusus, stepsons of the emperor. The latter years of Augustus's long reign (B. C. 31–14 A. D.) were clouded by domestic bereavements and by the terrible disaster which befell the legions of Varus in the Teutoberger Forest (A. D. 91). During this reign was established the famous *Prætorian Guard* which later was able to make or unmake emperors at will. Augustus was a liberal patron of architecture and letters, granting favors to the writers of the day through his famous minister Mæcenas.

During the first 200 years of the empire the forms of constitutional government were generally observed. The oppression of the occasional tyrants, as Tiberius and Nero, affected chiefly the capital, the provinces being usually unmolested and well governed. Tiberius (14–37) at first ruled with wisdom and moderation, but afterward became suspicious, cruel, and tyrannical. The law of *majestas* was revived for the purpose of more securely protecting the person of the emperor, in consequence of which the nefarious trade of *delator*, or informer, flourished. The instrument and indeed the cause of many of Tiberius's infamous acts was the notorious minister Sejanus. During

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this reign occurred the preaching and crucifixion of Jesus Christ. Caligula (37-40) began his rule with every show of mildness and piety, but the weight of responsibility and arduous duties seems to have unsettled his mind, for he entered upon a series of follies which cannot otherwise be explained. Extravagance, insolence, and vicious excess marked every act, so that all Rome breathed more easily when an officer of the prætorian guard avenged an insult by killing him. The prætorian guard brought forward as emperor Claudius (41-54), the brother of Germanicus, who in the year 16 had retrieved the defeat of Varus by the German tribes. Although an old man, apparently of little firmness or ability, Claudius gave Rome in some respects an excellent reign. He was, however, under the control of unprincipled favorites and vicious wives. Among the latter were the infamous Messalina and the wicked Agrippina, the latter of whom poisoned him to make way for her son, Nero. Under Claudius the conquest of Britain was accomplished, and Rome's position in the Eastern provinces strengthened. Among the important public works executed in this reign were the Portus Romanus, at the mouth of the Tiber, and the famous Claudian Aqueduct, which brought water to the city a distance of 45 mi. The reign of Nero (54-68), whose name has become a synonym of tyranny and persecution, began with the fairest promise, but ended in the most shameful dishonor. A kindly thrust by a slave saved him from death by scourging as a public enemy. In 64 occurred the Great Fire, destroying more than half of Rome, which was speedily rebuilt. The persecution of the Christians was an outcome of this disaster.

After the three short reigns of Galba, Otho, and Vitellius (68-69), the favorite commander Vespasian (69-79) was chosen emperor. So prosperous and free from tyranny were his reign and the following that they are together called, in his honor, the Flavian Age, his name having been Flavius Vespasian. In Gaul a revolt was quelled, and in Britain the Roman frontier was pushed by Agricola as far northward as Scotland. In 70 occurred the memorable siege and capture of Jerusalem by the emperor's son, Titus. The temple was destroyed and a million Jews are believed to have perished. At Rome Vespasian built a new forum and the Flavian Amphitheater, which became famous as the Colosseum. The principal event of the short reign of Titus (79-81), called the "Delight of Mankind," was the eruption of Vesuvius, by which Pompeii and Herculaneum were destroyed (79). Domitian (81-96), the last of the "Twelve Cæsars," was cruel and tyrannical, and his infamous life was finally ended by members of his own household. In his reign took place the "second persecution of the Christians." The title Cæsar was retained in succeeding reigns, but the first twelve are grouped together because Suetonius's biographies ended with Domitian. The five succeeding rulers—Nerva, Trajan, Hadrian, and the two Antonines—were elected by the senate, now in part restored to its former importance,

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and so happy and prosperous were their reigns that they are known as "the five good emperors." Nerva (96-98) was a native of Crete, the first of many emperors chosen from the provincials. He was, if possible, too lenient, and to strengthen his rule associated with him Trajan, who succeeded him in 98. Trajan (98-117) was a great military commander, and spent much of his reign in extending the limits of the empire in Gaul and the East. In 115 he subdued the king of the Parthians. He was a liberal patron of architecture and literature. In Rome the Trajan Forum and the famous Trajan's Column were memorials of his reign. Under his prosperous rule the Roman Empire extended its boundaries to the farthest limits attained in its history. The senate conferred on Trajan the title of *Optimus*, "the Best." Hadrian (117-138) showed great talent and wisdom in his government. The conquests of Trajan beyond the Danube and Euphrates were relinquished, Hadrian seeing the danger of too distant boundaries. He spent 15 years in visiting the various provinces of the empire and did much to consolidate the interests of conquered and conquerors. Athens was greatly benefited by his liberality. In 131 the Jews in Palestine rose in revolt and were subdued with great slaughter. Hadrian added many splendid buildings to Rome.

The reign of Antoninus Pius (138-161) was pure and peaceful, the emperor ruling "with a single view to the happiness of his people." He was succeeded by Marcus Aurelius (161-180) who had long been associated with him in the government. The scholarly tastes and habits of Aurelius gave him the title of "Philosopher." He was himself a writer of ability. Among his measures for the poor was the remittance of all taxes due from them, and the establishment of a home for orphan girls. Aurelius's peaceful pursuits were disturbed by troubles in the East, which were quelled, but resulted in bringing to Italy the dread Asiatic plague. The country was now threatened by inroads of barbarians from the North, who were checked only by the heroic and untiring efforts of Aurelius and his legions. After his death the senate declared Marcus Aurelius a god. With the reign of his son Commodus (180-192) began the decline of the Roman Empire, at first gradual, but then hastening rapidly to its inevitable fall, accomplished by tyrannical, incompetent rulers within, and invincible hordes of barbarians without. In this period only the emperors more conspicuous than the rest for their cruelty, and the few whose genius tried to stem the current, will be mentioned. The cruel and vicious Commodus died by assassination, as did many of his successors. His successor, Pertinax, was murdered by the Prætorians, who sold the empire for \$12,000,000. Septimus Severus (193-211) was placed on the throne by his legionary troops. He disbanded the prætorian guard and punished his rivals with great severity. He conducted successful campaigns against the Parthians, and visited Britain, dying at York. Alexander Severus (222-235) gave Rome a pure and able govern-

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ment, and sought to check the military supremacy and the corrupt tendencies of the times, but finally fell by assassination.

The period of anarchy (251-68) known as the "Age of the Thirty Tyrants" seemed to indicate the dissolution of the empire, but it was saved for a time by the succession of "five good emperors," Claudius, Aurelian, Tacitus, Probus, Carus (268-84). Of these the most famous is Aurelian (270-75), who defeated the Goths in Pannonia, drove the Alemanni out of Italy, and built a wall about Rome 13 mi. in length. In 273 he captured the city of Palmyra, in Syria, whose famous princess Zenobia had defied the Roman armies and declared herself "Queen of the East." With the reign of Diocletian (284-305) the last trace of republicanism vanished, and Rome became an absolute monarchy. This alone saved the empire for nearly 200 years more. The era beginning with Diocletian is regarded by some historians as the Second Period of Imperialism. Under this emperor began the division of government administration which finally resulted in the separation of East and West. Diocletian is remembered for his terrible persecution of the Christians, who found refuge only in the Catacombs. This was the last pagan persecution of the church, for under Constantine the Great (306-337) Christianity became the state religion, by the famous Decree of Milan (313). How far his conversion was due to conviction, how far to political policy, is not certain. In his domestic life Constantine was cruel and tyrannical. For 18 years of his reign he fought to gain supremacy over rival claimants for the throne, and by 324 every competitor had been crushed. In 325 he called the first General Council of the church at Nicæa, to settle the disputes between the Arians and the Athanasians, and the result was the formulation of the Nicene Creed. In 330 the capital of the empire was removed to Byzantium, afterward Constantinople; at the separation of West and East in 395 this city became the capital of the Byzantine Empire. The division of the empire among Constantine's sons led to a struggle lasting till 350, when Constantius became sole emperor. He was succeeded by Julian the Apostate (361-63), so-called because of his strenuous but fruitless efforts to extirpate Christianity and restore paganism.

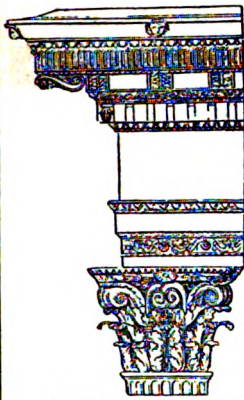
Jovian (363-64) surrendered to the Persians nearly all the Roman territory beyond the Euphrates. In the reigns of Valentinian and Valens (364-78) the barbarian tribes on the North again became threatening, while in Africa the Moors, in Britain the Scots and Picts, almost destroyed the Roman supremacy. Valentinian fought heroically against the tribes on the Danube frontier until his death (375). In 376 the Visigoths, fleeing from the terrible Huns, were allowed by Valens, who still ruled in the East, while Gratian had succeeded in the West, to cross the Danube and settle as allies. The Ostrogoths soon followed, but the agents of the government allowed them, for bribes, to keep their arms, and on

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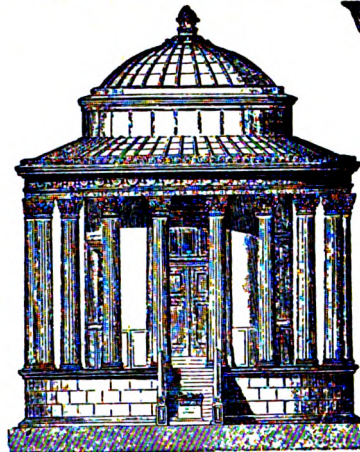
the other hand exasperated them by unfair dealing, and the final result was a battle between the allied Goths and the Romans near Adrianople, in which the latter were annihilated (378). Under Theodosius the Great (379-95) the Romans succeeded in subduing the Goths, and more than 40,000 of them became allies. After the death of Gratian various rivals ruled for brief periods at Rome, but in 394 Theodosius established his sole power. At his death (395) the empire was divided between his sons Arcadius and Honorius, the latter receiving the West, the former becoming first sovereign of the Byzantine Empire. Between East and West jealousy arose, and often the former saved themselves from barbarians by inducing them to turn their hordes against Italy. Such was the case when the Goths revolted under Alaric (398). They later invaded Greece, whence they were driven by Stilicho, the brave general of Honorius. Following them cautiously into Italy, he utterly defeated them (403). A tremendous host of German tribes, Vandals, Suevi, and Burgundians, invaded Italy in 406, but were skillfully entrapped by Stilicho. The deliverer of Italy was soon afterward executed by the ungrateful Honorius. A treacherous massacre of barbarian hostages brought on a revolt of the Gothic mercenaries. These were joined by their kinsmen beyond the Alps, and soon the vast host under the leadership of Alaric was before Rome (409). The city was saved for a time by the payment of a large ransom, but Honorius foolishly ignoring the stipulations made with Alaric, Rome was taken and sacked (410).

Meanwhile in the provinces Roman rule had ended with the withdrawal of the legions to defend Italy. The provincials in Britain called the Angles and Saxons to their aid against the Scots and Picts, and the island passed into their hands (449). The Vandals passed through Spain, crossed the Strait of Gibraltar and took Carthage (439), which became the seat of their dread empire. While the Germanic tribes were busy securing the fragments of the crumbling Roman Empire, the terrible Huns of Attila appeared. After exacting tribute from the Eastern emperor he turned his army of 700,000 warriors westward, and crossed the Rhine into Gaul. The Gothic tribes and the conquered Romans, the united peoples of the West, drew up to oppose the "scourge of Europe," and at Châlons, in Northern France, a terrible and decisive battle was fought (451). The year after his defeat Attila marched his hosts into Italy and threatened Rome, but was induced by the pleas of Leo the Great, the Christian bishop, and by large bribes, to spare the city. In 455 the dreaded Vandals under Genseric sailed up the Tiber. Once more Leo appealed to save the city. Genseric spared the lives of the citizens, but gave the city over to sack and plunder for two weeks. With the vast and precious spoils and 30,000 slaves the fleet sailed back to Carthage, the city Rome had leveled to the ground 600 years before. In spite of Genseric's promise the Vandals had

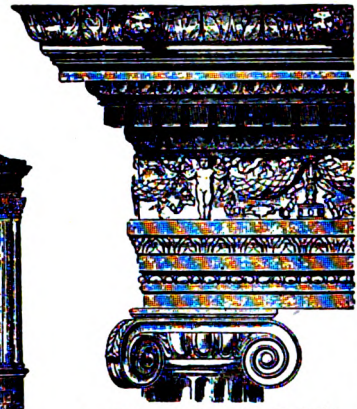




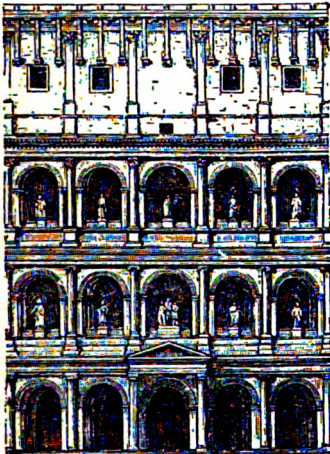
1. Frame-work of Corinthian style of the Temple of Jupiter at Rome.



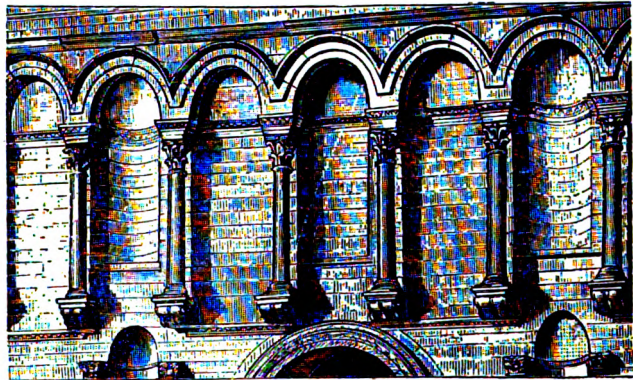
2. Round Temple at Tivoli (reconstructed).



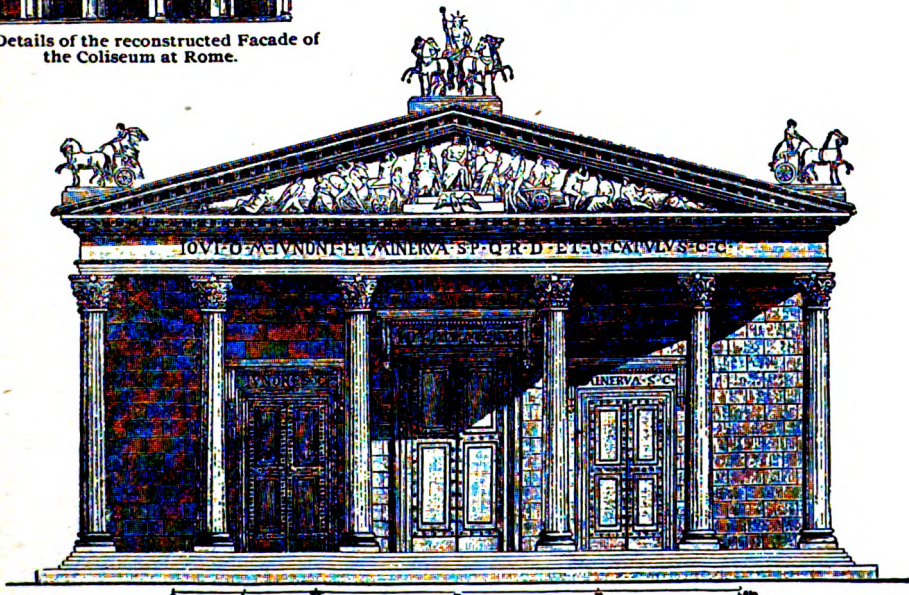
3. Framework in Ionic style of the Temple of Fortuna Virilis at Rome



4. Details of the reconstructed Facade of the Coliseum at Rome.



5. Details of the Porta-Aura (Golden Gate) of the Diocletian Palace at Spalato



6. Temple of Jupiter Capitolinus at Rome

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slaughtered and burned on every side. Between 456 and 472 Count Ricimer created and deposed emperors at will. Roman sovereignty had now been reduced to a shadow, and the last actor in the imperial farce bore the name, strangely enough, of Romulus Augustus, known as "Augustulus." In 476 Odoacer, chief of the Heruli, having demanded lands for his followers, in return for services to the empire, and been refused, dethroned the child king, who was treated kindly, and took the title "King of Italy." The senate sent the imperial vestments to Zeno, at Constantinople, asking that Odoacer, with the title "Patrician," might rule Italy as viceroy of the Eastern emperor. Thus did the Roman Empire in the West come to an end (476). Rome now became a province of the Byzantine (or Eastern) Empire, and was ruled in theory, sometimes in fact, from Constantinople, until in 800 the crown of the Western Empire was placed on the head of Charlemagne.

*Language and Literature.*—Latin is a branch of the Indo-European, or Aryan, family of languages. The several dialects of ancient Italy, of which Latin was the successor and literary representative, form the Italic group. Latin was spoken by the people of Central Italy perhaps as early as 1500 B.C. In the period of the Roman Republic and the empire it received its literary form, and it is to the language of that time the designation "classical" is given. During the last two centuries of the empire, Latin became much corrupted through contact with other languages, and this process was still more marked after the fall of Rome. By the eighth century it had ceased to be a generally spoken tongue, and in the several countries where Roman civilization had been established it had developed into the several Romance idioms which have survived in the modern Romance languages. The chief representatives, besides Italian, are French, Spanish, Portuguese, and Roumanian. In Britain the effect upon the language of the first contact with Latin was not considerable, owing to the early extinction of Roman supremacy there and the overpowering inroads of Germanic tongues. It is to be noticed that the Romance tongues are descended, not from classical Latin, but from what is known as the folk-Latin, the corrupted idiom of later popular speech. During the Dark Ages, Latin continued, in a corrupted form, to be the language of the church, law, and learning, and in some countries remained so until within two centuries. In still later times it was employed, restored to its classical form, in learned writings and as a means of international communication. The importance of Latin for the latter purpose is recalled in the name by which the student quarter of Paris is still known, it having been so designated because Latin was the medium of communication among the students who flocked to the university from every country of Europe. It was the clergy who preserved the Latin language and literature in the Dark Ages, and to the convents were carried the remnants of the libraries. The Benedictine

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monks copied many of the manuscripts; later writing materials became scarce, and often an ancient work was erased from a parchment to give place to some religious composition. By a remarkable discovery it has been found possible to restore the ancient characters on these palimpsests, as parchments so employed are called.

The language and literature became the subjects of study and investigation in all the European centers of learning which the universities had established. The foremost place in this branch of scholarship belongs to Germany: In structure and vocabulary Latin is more closely related to Greek than to any other Indo-European language, an interesting evidence of the probably close relationship of the two races. The Latin language is remarkable for its accuracy of expression, its perfect mechanical structure, objected to by some as being too rigid. It was indeed well fitted for its important service in the law. The proportion of Latin words in the English vocabulary is very large, about three sevenths; the great majority came in through the Norman conquest.

As Latin has never ceased to be spoken as a learned language, its pronunciation has followed in general the principles governing the language of each country in which it is used. Thus *Cicero* as a Latin name would usually be pronounced in America and England, *Sisero*, in Italy, *Chichero*, in Germany, *Tsitsero*, and in Spain, *Thithero*. In America a method known as the *Roman* is, however, now almost universal in the universities, colleges and high schools of the country. This is an attempt to attain to the real pronunciation of Latin in the time of Cicero. The vowels are pronounced almost as in Italian, French and Spanish, and the consonants have their English sounds with the exception that C and G are always hard; R is trilled; S is voiceless; Z is like DZ; PH, TH and CH are really aspirated consonants. In England the so-called *English method* is still used in the schools, the Latin words being pronounced precisely as if they were English. The *Continental* pronunciation is that used in the services of the Roman Catholic Church in all countries, though modified, of course, by the native language of the speaker. This form of pronunciation was developed during the Middle Ages. Latin accent was originally always on the first syllable; in the classical period, however, the accent fell always on the penult, if long; but if the penult was short, on the antepenult.

The character of Roman civilization, the constant strife at home or abroad, the martial spirit of the age, all were unfavorable to the production of a rich and varied literature. Like Sparta, the martial city of Greece, Rome loved the soldier better than the poet. Even the amusements of the people were of a heroic or warlike character. After the exciting sports of the circus or the deadly combats of the gladiatorial arena, the dramatic stage seemed tame indeed, and so in comparison with the literature of Athens the dearth of dramatic composition is the most striking



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feature. While, therefore, Latin literature is inferior to Greek, and in some departments is a poor imitation of older models, there is yet much of value. One department, the satire, we shall find peculiarly and successfully developed in Rome. Under Latin literature might properly be included the many works of science, philosophy, law, religion, and criticism that have been written in that language since the fall of Rome; but it is the period of its existence on native soil, the period of Latin literature at Rome, that is commonly understood by this title. As in Greece, so in Italy the center of political life was the center of literary activity. Roman literature falls into distinctly marked periods, the names of which indicate in general the character of their productions. The Legendary Age extends from the obscure beginnings under the Roman kingdom, through the first half of the republic and down to 240 B.C. To this period belong the lays and ballads of the Heroic Age when Rome was under Etruscan influence. As in Greece, the earliest poetry was probably associated with festal songs and dances, with religious and funeral ceremonies. The heroes of early Rome were celebrated in verse, and many of these ballads were afterward mistaken for history by Roman writers. Of these we have mere fragments and allusions in the writers of the later republic. Such, doubtless, were the tale of Romulus, the story of the Sabine women, the combat of the Horatii, and the Curiatii, the account of Tarquin the Proud, of Lucretia, of Coriolanus, in all of which there was some history and much legend. The remnants of the Legendary Age are chiefly religious songs and political documents. The earliest prose composition of importance was the *Law of the Twelve Tables*, about 450 B.C.

The second period is the Era of the Drama (240-17 B.C.); here belong also the natural and artless poetic productions of the later republic. The Golden Age extends to the death of Augustus (14 A.D.), and embraces most of the masterpieces of Latin literature. It falls into two subdivisions, the Ciceronian Age, that of artistic prose, and the Augustan Age, that of the famous poets. The Silver Age ends with the death of Hadrian (138 A.D.); here belong philosophical, ethical, and scientific writings, and especially the satire. The Iron Age extends to the fall of the empire. Livius Andronicus (284-204 B.C.), was brought to Rome as a prisoner of war from some city of Magna Græcia. He was afterward freed and became a teacher, writer, and actor. Andronicus was the first to make Greek literature familiar to the Romans. He translated and imitated Greek plays, transforming and developing the mimic performances which had been introduced at Rome by Etruscan actors in the preceding century. He also translated the *Odyssey*, which became the leading text-book of the Roman youth. Nævius (d. 204) was the first native-born Roman poet of importance. He wrote an epic on the *First Punic War*, in which he had fought, and was translator and

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author of tragedies and comedies. His first original works were imitations of the Greek, especially *Aristophanes*. In his comedies he attacked powerful patrician families and in consequence died an exile. Ennius (239-169) is styled the "Father of Latin poetry." His numerous dramas were based on Greek originals, but showed great variety and originality of treatment. His chief work, however, was the *Annals*, an epic poem in eighteen books, narrating the story of Rome from the times of the kings. Only fragments remain. Until the Augustan Age, Ennius remained the favorite Roman poet. Vergil was much indebted to him, and borrowed from the earlier master some of his finest passages. At first opposed to Ennius and Greek culture, but afterward converted, was the elder Cato, an able prose writer and the author of *Origines*, a valuable historical work.

Best known of the Roman dramatists are Plautus and Terence. Plautus (254-184) was the greatest of Roman comic poets. He adapted the New Attic Comedy to his use, especially the works of Menander, an Attic dramatist of whose hundred plays only quoted fragments remain. Plautus led a varied and reckless life, which brought him into touch with all classes. He prudently avoided political allusions. Twenty of his plays, besides some fragments have come down. Most famous, perhaps, is the *Miles Gloriosus*, the model of Udall's *Ralph Roister Doister*, the first English comedy. The most original of his comedies is the *Amphitruo*; others are the *Captivi*, *Trinummus*, and *Menæchmi*. Plautus aided materially the development of the Latin language. Terence (186-159) was born at Carthage, went to Rome as a slave, but was soon liberated. He came under the notice of Cæcilius, the leader in Roman literary circles, who encouraged and aided him. Terence's dramas were written for the cultured classes, with whom he associated, and were of a higher tone than Plautus's. His six plays are chiefly based on the Greek dramatists Menander and Apollodorus. Best known are the *Heauton Timorumenos*, *Andria*, and *Phormio*. He is said to have visited Greece to study the performance of comedy in that country, and to have perished at sea on his return; with him were lost his translations of Menander's 108 plays. In the last century of the republic appeared a new and popular form of poetry, created with great skill by Lucilius (d. 103). The corruption and extravagance of the period, the failings of Roman society, these Lucilius knew and cleverly satirized. To him the satirists of the Silver Age are greatly indebted. Accius (d. 90?) was the author of popular historic tragedies, of which fragments remain. Lucretius (96-55) is the most famous Roman philosophical poet. His *De Rerum Natura*, (*On the Nature of Things*) is a didactic poem treating of physics, psychology, and ethics from the standpoint of a philosopher. Many scientific theories and discoveries of modern times are hinted at by Lucretius.

Catullus (87-54) was the friend of Cæsar,



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Cicero, and other great men of the day. Because of his sweet-toned muse and wayward life he has been called "the Roman Burns." Catullus is a most exquisite writer of impassioned love-poetry. His lyrics, elegies, and epigrams number 116 poems. One of the most eminent and honored citizens of Rome in the last troublous years of the republic was Varro (116-26 B.C.), "the most learned of the Romans." He suffered proscription, but was restored to his rights by Augustus. Varro's writings were cyclopædic in character and scope, and are said to have included 500 works on grammar, satire, history, philosophy, and the drama. Most valuable was his work on agriculture, written in his last years. To Varro the Romans owed the foundation of their best culture. The partisan strife and grave perils of the later republic produced the orators that made the Roman Forum famous. The foremost orators of the day were statesmen, politicians, or lawyers; the audience was the senate, the people, or the judges. The study of law and politics occupied the best minds of the day, so that eloquence, learning, and logic were combined in the oratorical efforts. Many of the men whose names are foremost in the history of the republic were orators. Junius Brutus, the Scipios, Cato the Censor, Appius Claudius the patriot of unerring judgment; the Gracchi, Tiberius and Caius, the champions and the idols of the people; Julius Caesar, simple but forceful; Mark Antony, the most famous funeral orator in the world's history,—all would have done far less to make history without the gift of oratorical eloquence. Hortensius (b. 114 B.C.) was renowned as a jurist and an advocate. His law practise brought him enormous wealth, which he sometimes used to corrupt the courts. Most famous of Roman orators is Cicero (106-43), brilliant statesman and scholar, faithful friend and inveterate enemy. His orations are among the treasures of Latin literature and are far more valuable than his philosophical writings. Cicero's learning enabled him to enrich the vocabulary and art of expression to a considerable degree, and to him we are most indebted for the polish and perfection of classical Latin. To the Ciceronian age belong the principal historical works of Latin literature, Tacitus excepted. Cornelius Nepos was the author of biographies of Cato and Cicero, of a work on *Eminent Men*, and various historical writings in a simple and popular style.

The model of Latin narrative prose is Caesar's *Commentaries*. Less famous is his history of the civil war. However monotonous the subject matter may seem, the composition of the *Commentaries on the Gallic War* is marvelously clear and concise. A Latin grammar, treatises on astronomy and divination, and even poems are among Caesar's works. Sallust (86-34) is the most artistic of Roman historians, and the little he wrote has been esteemed a model of Latin prose. Of his two works, the *Jugurthine War* and the *Conspiracy of Catiline*, the latter is the more widely known, forming as it does,

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an interesting companion work to Cicero's famous orations against the notorious traitor. Livy (59 B.C.-17 A.D.) falls in the Augustan Era of the Golden Age. His valuable *Annals* covered the whole period of Roman history down to 9 B.C. Of the 142 volumes only 35 books remain to us. While not always reliable, his history is graceful and entertaining. It is essentially popular, not unlike the work of Herodotus and Macaulay. The Augustan Age is memorable for the great triumvirate of poets, Vergil, Horace, and Ovid. The political tranquillity of Augustus's reign, his liberal patronage of letters, aided and promoted by his famous minister Mæcenas, the wide limits of the empire and consequent possibility of securing a wide and attentive audience,—all combined to call forth the productions which have made the Augustan Age a synonym of perfected poetic effort. Of the triumvirate the greatest is the universally read and admired epic poet Vergil, whose *Aeneid* is to Latin literature what the *Iliad* and *Odyssey* of Homer are to the Greek. Horace (65-8 B.C.) was the friend of Vergil, through whom he gained the patronage of Mæcenas and Augustus and became a courtier. He had studied at Athens and fought at Philippi (42), where—as he tells us—he ingloriously deserted. Horace's *Odes* are models of lyric grace and beauty, and in this field the poet has never been equaled. His *Satires* ridicule the failings of the time, but they do not sting like Juvenal's. Other poems and collections are his *Epodes*, *Epistles*, *Carmen Sæculare*, and *Ars Poetica*, the last a pioneer in the subject of metrical construction.

Ovid (42 B.C.-18 A.D.) was less fortunate than Vergil and Horace, having for some unknown reason been banished by his former patron, Augustus. In exile he wrote his *Tristia*, but the *Amores* and the exquisite *Art of Love* were the product of his happier days. So, too, his *Metamorphoses*, the most celebrated of his works, completed just before his banishment. In 15 long books this poem tells of chaos and creation, of the races of men and giants, and finally of the metamorphosis, or transformation, suffered by gods and heroes, as told in the fables of Greek and Roman mythology. Less noted, but yet brilliant, were the elegiac poets Tibullus and Propertius, likewise members of the Augustan circle. The period following the reign of Augustus was favorable to the production of satirical poetry, and hence the chief poets of the Silver Age are the satirists, Persius, Juvenal, and Martial. In the disgraceful reigns of Tiberius, Nero, and Domitian, political corruption and social dissoluteness reached their height. The forces that were undermining the once splendid fabric of the Roman Empire worked swiftly and surely, and the efforts of the few good emperors were powerless to stay the progress of decay. The vigorous but fruitless protest of the satirists is the closing chapter of Latin poetry. The six satires of Persius (34-62 A.D.) contain much of the stoic philosophy. In spite of their bombast, they are earnest and highly moral in tone. Juvenal (60-140 A.D.) wrote in the age of Tra-

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jan. His sixteen satires are brilliant and caustic, giving an inimitable picture of the corrupt society of his time. Martial (43-104 A.D.) wrote 14 books of sparkling epigrams, most of which have a keen edge of satire. Two poets of the Silver Age not satirists were Lucan (38-65) and Statius (61-95). Lucan's only remaining work is the *Pharsalia*, an unfinished epic on the civil war between Cæsar and Pompey. Statius wrote two long, dull epics, the *Thebais* and the *Achilles*, the latter incomplete.

The chief historical writer of the Silver Age is Tacitus (55-117?). His works include the *Life of Agricola*, his father-in-law; the *Historia*, narrating the events of several reigns, beginning with Galba and ending with Domitian; the *Annales*, a history of the Julian emperors from Augustus. These histories are preserved only in part. Most famous of his works is the *Germania*, a valuable account of our Germanic ancestors in early times. The purpose of Tacitus, everywhere evident, is to contrast the simple virtues of the barbarian Germans with the shameless vices of cultured Rome. Suetonius (75-160) wrote the *Lives of the Cæsars*, a valuable biographical and historical account of the twelve emperors, including Julius Cæsar and Titus, in which many details of their private life are preserved. Quintus Curtius wrote, in the reign of Claudius, a *History of Alexander the Great*. Prominent among the writers on philosophy is Seneca (465 A.D.), a member of the Stoic School. The tutor and defender of Nero, he at last fell a victim to that thankless monster's cruelty. His ethical teachings sometimes seem to show the evidence of Christian influence, and are remarkable for their excellence. Besides his numerous works on philosophy, Seneca wrote ten tragedies, weak and artificial imitations. In the department of natural science Pliny the Elder (23-79) stands almost alone. His *Natural History* in 37 vols. is a cyclopædia of knowledge in its field and a monument of industry and research. Pliny's scientific zeal caused his death, for he was suffocated by sulphurous fumes while observing the eruption of Vesuvius which destroyed Pompeii and Herculaneum. His nephew, Pliny the Younger (62-113), devoted his life to literary pursuits. His preserved works include a fulsome eulogy of Trajan and many interesting *Letters*. While proprætor of Pontus, in Asia Minor, he wrote to Trajan the valuable letter on the spread of Christianity in that province. Chief of the ethical writers is the emperor Marcus Aurelius, whose *Meditations* contains the purest system of ethics prior to Christianity. Intimately connected with his name is that of the eminent teacher Epictetus, whose sayings we know only through a pupil, Arrian, for like Socrates, he put none of his doctrines in writing. Marcus Aurelius and Epictetus were the last of the Stoics, for even in their day pagan philosophy was beginning to retreat before the triumphant progress of the new Gospel.

A most important writer of the Silver Age is Quintilian (40-118), the great rhetorician and

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literary critic of Rome. After an honorable career of 25 years as an educational lecturer he was finally induced to publish his lectures. His valuable *Institutes* gives Quintilian's opinions as to a complete oratorical training, and contains (in Book X) a valuable list of works useful for rhetorical study, as well as an able comparative criticism of Greek and Roman literature. The *Noctes Atticæ* of Aulus Gellius (b. 130 A.D.) contains a compilation of information on general subjects of literature, language, law, philosophy, and science. A fragmentary and immoral, but valuable, work is the character novel of Petronius of which the chief part extant is known as the *Cena Trimalchionis*. Written in the reign of Nero, it gives a faithful satirical picture of society as the author saw it. The interesting portion mentioned above describes a feast given by a rich, ignorant, upstart young nobieman. The Iron Age contains almost nothing in the domain of pure literature. The Stoical writings of Marcus Aurelius gave place to those of the early Latin Church, where Latin gradually supplanted Greek as the language of the Christian Fathers. Foremost among these writers are St. Jerome (342-420) and Aurelius Augustine (354-430). The former is remembered as the translator of the Bible into Latin. Augustine's many writings include the autobiographical *Confessions*, and the wonderful book of prophecy and revelation called the *City of God*. The famous Boethius (470-526) is sometimes spoken of as "the last of the Romans." His *De Consolatione Philosophiæ* was highly prized by succeeding centuries, and was one of the works selected by Alfred the Great for translation into Anglo-Saxon. For the preservation of Rome's most precious legacy, her laws and judicial writings, the world is indebted to Justinian, emperor of the Eastern, or Byzantine Empire, through whose agency they were collected and incorporated into the *Corpus Juris Civilis*, 529 A. D.

**Rome**, the capital of Italy, as formerly of the Roman Empire, republic, and kingdom, and long the religious center of Western Christendom, is one of the most ancient and interesting cities of the world. It stands on both sides of the Tiber, about 15 mi. from the sea. The city is tolerably healthy during most of the year, but in late summer and early autumn, malaria prevails to some extent. It has been greatly improved in cleanliness and healthfulness since it became the capital of modern Italy.

*Ancient Rome.*—The streets of ancient Rome were crooked and narrow, the city having been rebuilt, after its destruction by the Gauls in 390 B.C., with great haste and without regard to regularity. It was greatly improved by Augustus, who extended the limits of the city and embellished it with works of splendor. The Campus Martius during his reign was gradually covered with public buildings, temples, porticoes, theaters, etc. In the reign of Augustus the population is believed to have amounted to about 1,300,000, and in that of Trajan was not far short of 2,000,000. Rome is said to have been surrounded by walls at

three different times. Ancient Rome had eight or nine bridges across the Tiber, of which several still stand. The open spaces in ancient Rome, of which there were a great number, were distinguished into *campi*, areas covered with grass; *fora* which were paved; and *areae*, a term applied to open spaces generally, and hence to all those which were neither *campi* nor *fora*, such as the squares in front of palaces and temples. Of the *campi* the most celebrated was the Campus Martius already mentioned, and after it the Campus Esquilinus on the east of the city. Among the latter the Forum Romanum, which lay northwest and southeast, between the Capitoline and Palatine Hills; and the Forum of Trajan, between the Capitoline and Quirinal, are the most worthy of mention. The first was the most famous and the second the most splendid of them all. The great central street of the city was the Via Sacra (Sacred Way), which began in the space between the Esquiline and Caelian hills proceeded thence first southwest, then west, then northwest, skirting the northeast slope of the Palatine, and passing along the north side of the Forum, and terminated at the base of the Capitoline. The two principal roads leading out of Rome were the Via Flaminia (Flaminian Way) or great north road, and the Via Appia (Appian Way) or great south road. Ancient Rome was adorned with a vast number of splendid buildings, including temples, palaces, public halls, theaters, amphitheaters, baths, porticoes, monuments, etc. The oldest and most sacred temple was that of Jupiter Capitolinus, on the Capitoline Hill. The Pantheon, a temple of various gods, is still in excellent preservation. It is a great circular building with a dome roof of stone 140 ft. wide and 140 ft. high, a marvel of construction, being 2 ft. wider than the great dome of St. Peter's. Other temples were the Temple of Apollo, which Augustus built of white marble, on the Palatine, containing a splendid library; the Temple of Minerva, which Pompey built in the Campus Martius, and which Augustus covered with bronze; the Temple of Peace, once the richest and most beautiful temple in Rome, built by Vespasian, in the Via Sacra; the Temple of the Sun, which Aurelian erected to the east of the Quirinal; and the magnificent Temple of Venus, which Caesar caused to be built to her as the origin of his family. The principal palace of ancient Rome was the *Palatium* or imperial palace, on the Palatine Hill, a private dwelling-house enlarged and adopted as the imperial residence by Augustus. Among the theaters, those of Pompey, Cornelius Balbus, and Marcellus were the most celebrated. The most magnificent of the amphitheaters was that of Titus, completed A.D. 80, now known as the Coliseum or Colosseum. The principal of the circuses was the *Circus Maximus*, between the Palatine and the Aventine. The public baths in Rome were very numerous. The largest were the *Thermae* of Titus, part of the substructure of which may still be seen on the Esquiline Hill; the *Thermae* of Caracalla, even larger, extensive remains of which still

exist in the southeast of the city; and the *Thermae* of Diocletian, the largest and most magnificent of all, part of which is converted into a church. Of the triumphal arches the most celebrated are those of Titus, Severus, and that of Constantine, all in or near the Forum and all well preserved structures; that of Drusus in the Appian Way, much mutilated; that of Gallienus on the Esquiline Hill, in a degraded style of architecture. Among the columns the most beautiful was Trajan's Pillar in the Forum of Trajan, 117 ft. in height, still standing. A flight of stairs within the pillar leads to the top. Among the magnificent sepulchral monuments, the chief were the Mausoleum of Augustus in the Campus Martius; and that of Hadrian, on the west bank of the Tiber, now the fortress of modern Rome, and known as the Castle of St. Angelo. The city was also rich in splendid private buildings, and in the treasures of art. The catacombs of Rome are subterranean galleries which were used as burial places and meeting places, chiefly by the early Christians, and which extend under the city itself as well as the neighboring country.

*Modern Rome. General Features.*—It was not till the seventeenth century that the modern city was extended to its present limits on the right bank, by a wall enclosing both the Janiculum and the Vatican hills. The boundary wall on the left or east bank of the river follows the same line as that traced by Aurelian in the third century, and must in many parts be identical with the original structure. The city is entered by twelve gates and several railway accesses. Since Rome became the capital of United Italy great changes have taken place in the appearance of the city, many miles of new streets being built, and much done in the way of paving, drainage, and other improvements. It has thus lost much of its ancient picturesque appearance. It is still, however, replete with ever-varying and pleasing prospects. The extensive excavations recently carried out have laid at last completely bare the remains of many of the grandest monuments of ancient Rome, notably the whole of Forum Romanum and the Via Sacra, the remains of the temples of Saturn and of Castor and Pollux, the temples of Vespasian, of Antoninus and Faustina, the Temple of Vesta, etc. There are seven bridges across the Tiber within the city. A vast scheme of river embankment has been carried out to prevent the lower-lying parts of the city from being flooded as in former times. Among the principal streets and squares of modern Rome are the Piazza del Popolo immediately within the Porta del Popolo on the north side of the city near the Tiber, with a fine Egyptian obelisk in its center, and two handsome churches in front, standing so far apart and from the adjoining building as to leave room for the divergence of three principal streets, the Via di Ripetta, the Corso, and the Via del Babuino. The appearance of the Capitol has been entirely altered to permit the erection of a monument to Victor Emmanuel. The Via del



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Babuino proceeds first directly to the Piazza di Spagna, thence to the Quirinal, and by a tunnel opens out on the Esquiline. It contains a large number of handsome edifices. The chief open spaces besides the Piazza del Popolo are the Piazza S. Pietro, the Piazza Navona, the Piazza di Spagna, the Piazza Barberini, and the Piazza Colonna, in the center of the city. Larger spaces for amusement or exercise have been formed only in a few spots. One of the finest is the Pincio, or "hill of gardens," overlooking the Piazza del Popolo, and commanding a fine view. The most remarkable church is of course the cathedral of St. Peter, the largest and most imposing to be found anywhere. Another remarkable church is that of San Giovanni in Laterano, on an isolated spot near the south wall of the city. Santa Maria Maggiore, which ranks third among the basilicas, was founded by Pope Liberius, but has since had many alterations and additions. Santa Croce in Gerusalemme, takes its name from its supposed possession of a portion of the true cross, and a quantity of earth which was brought from Jerusalem and mixed with its foundation. Other churches are those of San Clemente, Il Gesù, on the Corso; the principal church of the Jesuits, Sta. Maria-degli-Angeli, originally a part of Diocletian's Baths, converted into a church by Michael Angelo; Sta. Maria in Ara Celi, on the Capitoline; Sta. Maria in Cosmedin, at the northern base of the Aventine; Sta. Maria sopra Minerva, so called from occupying the site of a temple of that goddess; Sta. Maria in Dominica or della Navicella, on the Caelian.

*Palaces, Picture-galleries, etc.*—The Vatican, adjoining St. Peter's, comprises the old and new palace of the popes, the Sistine chapel, the Loggie and Stanze, containing some of the most important works of Raphael, the picture-gallery, the museums, and the library. The palace on the Quirinal was formerly a favorite summer residence of the popes, but is now occupied by the king of Italy. The Palazzo della Cancelleria is the only palace on the left bank of the river still occupied by the ecclesiastical authorities. A series of palaces crowns the summit of the Capitol, and surrounds the Piazza del Campidoglio. It is approached from the northwest by a flight of steps, at the foot of which two Egyptian lions, and at the summit two colossal statues of Castor and Pollux standing beside their horses, are conspicuous. The building contains the offices of the municipal administration and an observatory. Among private palaces may be noted the Palazzo Barberini, on the Quirinal, with a collection of paintings. The Palazzo Borghese is chiefly celebrated for its picture-gallery, containing the *Aldobrandi Marriage* and some other works of great renown. The Palazzo Colonna has a picture gallery and a beautiful garden containing several remains of antiquity.

*Educational Institutions, Charities, etc.*—Among educational institutions the first place is claimed by the university, founded in 1303.

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Attached to the university are an anatomical and chemical theater, and cabinets of physics, mineralogy, and zoology, as also botanic gardens, and an astronomical observatory. The university is attended by about 1,000 students. The Collegio Romano, formerly a Jesuit college, now contains the Archæological Museum and the recently established library, Biblioteca Vittorio Emanuele—consisting mostly of the old library of the Jesuits, augmented by the libraries of suppressed monasteries. The Collegio de Propaganda Fide has acquired great celebrity as the establishment where Roman Catholic missionaries are trained. The American School of Classical Languages is a flourishing postgraduate school under the direction of American scholars. The Accademia di San Luca, for the promotion of the fine arts, is composed of painters, sculptors, and architects, and was founded in 1595. Other associations and institutions connected with art, science, or learning are numerous. Besides the Vatican and Vittorio Emanuele libraries mentioned above, the chief are the Biblioteca Casanatense, 200,000 vols.; the Biblioteca Angelica, 150,000 vols.; the Biblioteca Barberini, 100,000 vols. Hospitals and other charitable foundations are numerous. The chief theaters are the Teatro Apollo, Teatro Argentina, Teatro Valle, the Capranica, Metastasio, Rossini, Costanzi, etc.

*Trade and Manufactures.*—The external trade is unimportant, and is carried on chiefly by rail, the Tiber being navigated only by small craft. There are railway lines connecting with the general system of Italy; and steamers from Civita Vecchia to Naples, Leghorn, and Genoa. A ship canal is projected to connect the city with the sea, and extensive embankment works are in progress to prevent inundation by the Tiber. The chief manufactures are woolen and silk goods, artificial flowers, earthenware, jewelry, musical strings, mosaics, casts, and objects of art. The trade is chiefly in these articles.

*History.*—From the downfall of the empire its history is mainly identified with that of the papacy. An important event in its history is its capture and sack by the troops of the Constable of Bourbon in 1527. In 1798 Rome was occupied by the French, Pope Pius VI was taken prisoner to France, where he soon afterward died, and a Roman republic was set up. In 1848 Pope Pius IX was driven from Rome, and another Roman republic formed under Mazzini and Garibaldi. A French army was sent to the pope's assistance, and after a determined resistance Rome was captured by the French in July, 1849, and the pope returned and resumed his power under the protection of French bayonets. The rule of the pope continued till October, 1870, when Rome was occupied by the Italian troops on the downfall of the French empire, and in June, 1871, the "Eternal City" became the capital of united Italy. The king took up his residence in the Quirinal. Pop. 1901, 462,783.

**Rome**, Oneida co., N. Y., on Mohawk River, 15 mi. w. of Utica. Railroads: N. Y. C. &

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H. R.: R. W. & O.: N. Y., O. & W. Industries: brass and copper co., two iron foundries, knitting mills, iron mills, harness, farm implement, bedstead, bathtub, and teakettle factories, locomotive and machine works. Surrounding country agricultural. The town was first settled about 1760 and was the site in 1777 of Fort Stanwix. The first U. S. flag ever displayed to the enemy was raised on Fort Stanwix in August, 1777. Pop. 1900, 15,343.

**Rome**, county seat of Floyd co., Ga., 79 m. n. w. of Atlanta; on the Coosa river, and on the Central of Georgia, the Southern and the Western & Atlantic railroads. Rome has an excellent waterpower, used in the manufacture of ice, lumber, oil, iron and machinery. It has also a large trade by rail and water in grain, grass, cotton and lumber. It is the seat of the Shorter College for Women (Baptist) and the Rome Female College. Pop. 1900, 7,291.

**Romney**, GEORGE (1734-1802), an English painter, b. near Dalton, in Lancashire. After a certain amount of local success he went to London in 1762, and next year won a prize offered by the Society of Art for a historical composition. He steadily rose in popularity, and was finally recognized as inferior only to Reynolds and Gainsborough as a portrait painter; some critics even placed him higher than either. Many distinguished Englishmen and many ladies of rank sat to him for their portraits; but perhaps the most beautiful of his sitters was Emma Hart, afterward Lady Hamilton, whom he depicted in numerous characters. He did not neglect historical or imaginative compositions, and he contributed several pictures to Boydell's famous Shakespeare gallery, founded in 1786.

**Romulus** was the mythical founder and first king of Rome. His mother was the vestal virgin, Sylvia (or Ilia), a daughter of Numitor, king of Alba. By the god Mars she became the mother of the twins Romulus and Remus, who were ordered by Amulius, the usurping brother of Numitor, to be thrown into the Anio. The basket containing the two boys was stranded beneath a fig tree at the foot of the Palatine Hill, and they were suckled by a she wolf and fed by a woodpecker, until they were accidentally found by Faustulus, the king's herdsman, who took them home and educated them. When they had grown up they organized a band of enterprising comrades, by whose help they deposed Amulius and reinstated Numitor on his throne. They next resolved to found a city, but as they disagreed as to the best site for it, they resolved to consult the omens. The decision was in favor of Romulus, who immediately began to raise the walls. This is said to have happened in the year 753 (according to others 752 or 751) B. C. Remus, who resented his defeat, leaped over the rude rampart in scorn, whereupon Romulus slew him. Romulus soon attracted a considerable number of men to his new city by making it a place of refuge for every outlaw or broken man, but women were still wanting. He therefore invited the Sabines with

## Rook

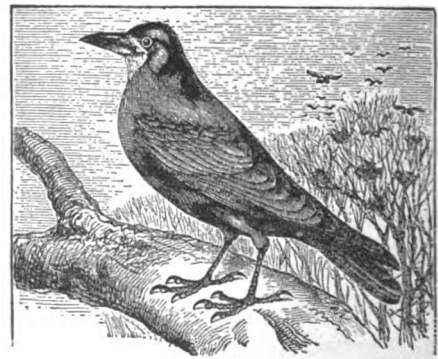
their wives and daughters to a religious festival, and in the midst of the festivities he and his followers suddenly attacked the unarmed guests, and carried off the women to the new city. This led to a war, which was, however, ended at the entreaties of the Sabine wives, and the two states coalesced. Romulus is said finally to have miraculously disappeared in a thunderstorm (B. C. 716).

**Roncesvalles** (ron-thés-vál'yés), a valley in Spanish Navarre, between Pampeluna and St. Jean de Port, where the rear of Charlemagne's army was defeated by the Gascons or Basques in 778, and the paladin Roland killed. Tradition and romance erroneously ascribe the victory to the Moors.

**Ronda**, a town of S. Spain, in the province of and 40 mi. w. of Malaga. Ronda is famous for its bull-fights, for which it has one of the largest bull-rings in Spain. It has manufactures of steel wares, cloth, etc., and is celebrated for its fruits. Pop. 19,181.

**Roof**, the cover of any building, irrespective of the materials of which it is composed. Roofs are distinguished, 1, by the materials of which they are mainly formed, as stone, wood, slate, tile, thatch, iron, etc.; 2, by their form and mode of construction, as shed, curb, hip, gable, pavilion, ogee, and flat roofs. The *span* of a roof is the width between the supports; the *rise* is the height in the center above the level of the supports; the *pitch* is the slope or angle at which it is inclined. In carpentry roof signifies the timber framework by which the roofing materials of the building are supported. This consists in general of the principal rafters, the purlins, and the common rafters. The principal rafters, or principals, are set across the building at about 10 or 12 ft. apart; the purlins lie horizontally upon these, and sustain the common rafters, which carry the covering of the roof. Sometimes, when the width of the building is not great, common rafters are used alone to support the roof.

**Rook**, a bird of the crow family, differing from the crow in not feeding upon carrion, but on insects and grain. It is also specially distinguished by its gregarious habits, and by



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the fact that the base of the bill is naked, as well as the forehead and upper part of the

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throat. In Britain and Central Europe the rook is a permanent resident; but in the north and south it is migratory in habits.

**Roon** (rōn), ALBRECHT THEODOR VON (1803-1879), a Prussian war minister, field marshal, and count. He entered the army at the age of eighteen, and speedily developed a high talent for the theoretical and educational branches of his profession, was military lecturer at Berlin, and published several books on military geography and similar subjects. Captain in 1836, major in 1842, colonel in 1851, he was appointed war minister in 1859, minister of marine in 1861, and instituted many reforms. In 1866 he was made general of infantry, and was present with the army in Bohemia during the Seven Weeks' War against Austria. It was chiefly due to his efforts that the North German army was in so perfect a state of readiness and able to be so rapidly mobilized on the outbreak of war with France in 1870. On the conclusion of the war Von Roon was made a count, and on Jan. 1, 1873, he became a field marshal and minister president of Prussia.

**Roosevelt**, THEODORE, b. in New York City in 1858. He was graduated from Harvard and became a member of the New York Assembly in 1882. He was U. S. Civil Service Commissioner from 1889 to 1890. In the latter year he became police commissioner of New York City, and was successful in carrying out reforms in the New York police. In 1897 he was appointed first assistant secretary of the navy by President McKinley. This position he resigned at the outbreak of the Spanish-American War to become a colonel of the First U. S. Volunteer Cavalry, known as the "Rough Riders." In 1898 he was elected governor of New York, and in 1900 vice-president of the U. S. On the death of President McKinley Mr. Roosevelt became president, Sept. 15, 1901. In 1904 he was elected president by the largest majority in the electoral college of any presidential candidate since the famous campaign of 1872. He has written a number of books, including *Hunting Trips of a Ranchman*, *Life of Gouverneur Morris*, *History of New York City*, *The Wilderness Hunter*, *The Rough Riders*, *Oliver Cromwell*, and *The Winning of the West*. Pl. 1, Vol. I.

**Root**, in arithmetic and algebra, denotes any number or quantity which, by successive multiplications into itself, produces a certain other number. Thus 2 is a root of 4, because  $2 \times 2 = 4$ . A number which once multiplied by itself gives a number is called the second or square root, if multiplied three times the third or cube root, and so on with the fourth or biquadrate, fifth, sixth root, etc. The algebraic sign of a root is  $\sqrt{\phantom{x}}$ , and the fourth root of 16, equal to 2, is written thus:  $\sqrt[4]{16} = 2$ . The same is the case with algebraic magnitudes, as  $\sqrt[3]{(a^2 + 2ab + b^2)} = a + b$ .

**Root**, ELIHU (1845—), a prominent N. Y. lawyer, b. in Clinton, N. Y., in 1845; graduated at Hamilton College, 1864; studied law at the University Law School in New York; began practice in that city in 1867. His first important case was the suit of the People vs.

## Rorqual

Ingersoll. He was leading counsel in the Hoyt and Havemeyer will cases, in the Stewart will cases, in the Hammersley will case, and has had considerable experience as a corporation counsel. In 1883-5, he was U. S. district attorney; in 1886-87, was chairman of the Republican county committee; in 1894, was chairman of the judicial committee in the Constitutional Convention of New York. He became secretary of war in Aug., 1899, and retained his position under President Roosevelt. He had a leading part in the organization of government in the Philippines and in Porto Rico, and in the reorganization of the army (which see). In 1903 he was a member of the Alaska Boundary tribunal. He resigned his cabinet position in that year, being succeeded by W. H. Taft.

**Root**, GEORGE FREDERICK (1820-1895), an American composer, was b. at Sheffield, Mass., taught music in Boston and New York, studied a year in Paris, and returned to write numerous songs that became widely popular. Among them are *Rosalie*, *the Prairie Flower*, *There's Music in the Air*, and, during the Civil War, *The Battle Cry of Freedom*, *Just before the Battle*, *Mother*, and *Tramp, Tramp, Tramp, the Boys Are Marching*. His more pretentious works, including a *Te Deum*, are less known. In 1872 he received a doctorate from Chicago University.

**Rope**, a general name applied to cordage over 1 inch in circumference. Ropes are usually made of hemp, flax, cotton, coir, or other vegetable fiber, or of iron, steel, or other metallic wire. A hempen rope is composed of a certain number of yarns or threads which are first spun or twisted into *strands*, and the finished rope goes under special names according to the number and arrangement of the strands of which it is composed. A *hawser laid rope* is composed of three strands twisted left hand, the yarn being laid up right hand. A *cable laid rope* consists of three strands of hawser laid rope twisted right hand. A *flat rope* usually consists of a series of hawser laid ropes placed side by side and fastened together by sewing in a zigzag direction. Wire ropes are made of a certain number of wires twisted into the requisite number of strands, and are now extensively used in the rigging of ships as well as for cables. For greater flexibility hempen cores are used; thus for instance we may have a rope of six strands around a hempen core, each strand consisting of six wires around a smaller hempen core. Steel wire makes a considerably stronger rope than iron wire.

**Roraima** (ro-rá-ē' má), a celebrated mountain in South America where the boundaries of British Guiana, Venezuela, and Brazil meet, 7,800 feet high, flat topped, with steep, rocky sides.

**Rorqual**, the name given to certain whales, closely allied to the common or whalebone whales, but distinguished by having a dorsal fin, with the throat and under parts wrinkled with deep longitudinal folds, which are supposed to be susceptible of great dilatation, but the use of which is as yet unknown. Two or three species are known, but they are rather avoided on account of their ferocity, the short-



## Rosa

ness and coarseness of their baleen or whale-bone, and the small quantity of oil they produce. The northern rorqual attains a great size, being found from 80 to over a 100 ft. in length, and is thus the largest living animal known. The rorqual feeds on cod, herring, pilchards, and other fish, in pursuing which it is not seldom stranded on the shore.

**Rosa**, MONTE, a mountain or group of the Pennine Alps, lies on the frontiers of the Swiss canton of Valais and Piedmont, and forms part of the watershed between the Rhone and the Po. Next to Mont Blanc it is the highest mountain in the Alps, but as a group it is much more massive than the Mont Blanc group. It has eight summits above 14,000 ft., the highest being Dufourspitze (15,217). Of the huge glaciers that occupy the slopes of this mountain the chief are the G6rner glacier on the west, the Schwarzberg and Findelen glaciers on the north, the Sesia and Macugnaga glaciers on the east, and the Lys glacier on the south.

**Rosa'ceæ**, a large and important order of plants, of which the rose is the type, distinguished by having several petals, distinct, perigynous, separate carpels, numerous stamens, alternate leaves, and exogenous mode of growth. The species, including herbs, shrubs, and trees, are for the most part inhabitants of the cooler parts of the world. Scarcely any are annuals. The apple, pear, plum, cherry, peach, almond, nectarine, apricot, strawberry, raspberry, and similar fruits, are the produce of the order. Some of the species are also important as medicinal plants. The genera of this order are divided by Viner into six tribes, viz., Roseæ, Spirææ, Amygdaleæ, Sanguisorbeæ, Dryadeæ, and Pomeæ.

**Rosamond**, commonly called Fair Rosamond, the mistress of Henry II of England, was the daughter of Walter de Clifford, a knight of property in various shires. She d. in 1176 or 1177 soon after her connection with the king was openly avowed, and was buried in the church of Godstow Nunnery, whence, however, Hugh of Lincoln caused her body to be removed in 1191. Almost everything else related of Rosamond is legendary. The fable of the dagger and poison with which the jealous Queen Eleanor is said to have sought out her rival has not been traced higher than a ballad of 1611.

**Rosan'iline** ( $C_{20}H_{19}N_3$ ), an organic base, a derivative of aniline, crystallizing in white needles, capable of uniting with acids to form salts, which salts form the well-known rosaniline coloring matter of commerce.

**Rosa'rio**, a town of the Argentine Republic, in the province of Santa Fé, on the right bank of the Parana, 170 mi. n.w. of Buenos Ayres. It is the second city in the republic. It has communication by rail and river with Buenos Ayres, and also by railway with the interior provinces. It contains foundries, brick-works, jam-factories, breweries, tanneries, soap-works, timber and flour mills, etc., but its commerce is of greater importance than its manufactures. Pop. over 55,000.

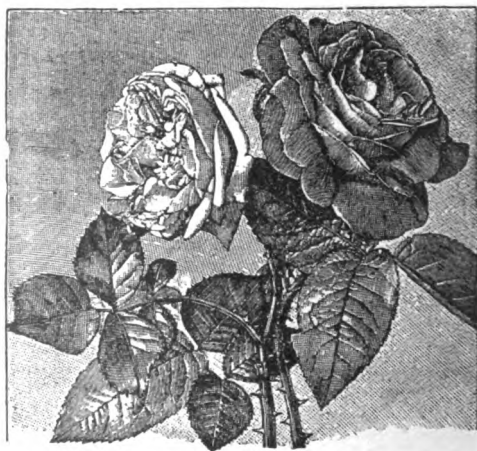
## Rose

**Ro'sary**, among Roman Catholics the recitation of the Ave Maria and the Lord's Prayer a certain number of times. The name is also commonly given to the string of beads by means of which the prayers are counted. The complete or Dominican rosary consists of 150 small beads for the Aves, divided into groups of 10 by 15 large beads for the Paternosters. The ordinary rosary has only 50 small beads and 5 large beads; but if repeated thrice makes up the full rosary. A doxology is said after every tenth Ave. The use of rosaries was probably introduced by the Crusaders from the East, for both Mohammedans and Buddhists make use of strings of beads while repeating their prayers; but St. Dominic is usually regarded as the inventor in the Roman Church.

**Roscius**, QUINTUS, the most celebrated comic actor at Rome, b. a slave about 134 B.C. He realized an enormous fortune by his acting, and was raised to the equestrian rank by Sulla. He enjoyed the friendship of Cicero, who in his early years received instruction from the great actor. Roscius d. about 62 B.C.

**Roscom'mon**, an inland county of Ireland, in the east of the province of Connaught, has an area of 607,691 acres, of which 480,813 are productive. Roscommon contains iron and coal, but limestone is the only mineral now worked. Many districts are highly fertile, and the pastures are among the best in Ireland. The chief crops are oats and potatoes. The chief towns are Roscommon, Boyle, and Castlerea. Pop. 114,194.

**Rose**, the beautiful and fragrant flower which has given name to the large natural



Tea-rose and Hybrid Perpetual.

order Rosaceæ, seems to be confined to the cooler parts of the northern hemisphere. The species are numerous, and are extremely difficult to distinguish. They are prickly shrubs, with pinnate leaves, provided with stipules at their base; the flowers are large and showy; the calyx contracts toward the top, where it divides into five lanceolate segments; the corolla has five petals, and the stamens are

## Rose Acacia

numerous; the seeds are numerous, covered with a sort of down, and are attached to the interior of the tube of the calyx, which, after flowering, takes the form of a fleshy globular or ovoid berry. The rose is easily cultivated, and its varieties are almost endless. Upward of 1,000 named varieties of the rose are now recorded. The North American species of roses, and especially those of the U. S., are few, those grown in our gardens being mostly of foreign origin.

**Rose Acacia**, a highly ornamental flowering shrub inhabiting the southern parts of the Alleghany Mountains, and now frequently seen in gardens of Europe. It is a species of locust; the flowers are large, rose-colored, and inodorous; the pods are glandular-hispid.

**Rose Apple** (or Malabar Plum). It is a branching tree, a native of the East Indies. The fruit is about the size of a hen's egg, is rose-scented, and has the flavor of an apricot.

**Rosebery**, ARCHIBALD PHILIP PRIMROSE, EARL OF (1847- ), was educated at Eton and Oxford, and succeeded his grandfather in 1868. He is an advanced Liberal in politics, and a ready and effective speaker. He was under-secretary at the home office from 1881 to 1883, lord privy seal and first commissioner of works 1885, and next year held the secretaryship of foreign affairs till the fall of the Gladstone government. In 1878 he was elected lord-rector of Aberdeen University, and in 1881 of Edinburgh University. In 1889 he became a member of the London County Council, and was appointed chairman of that body. The University of Cambridge conferred the degree of LL.D. on him in 1888. He has advocated the reform of the House of Lords, and is much interested in the questions of imperial federation and the social condition of the masses. In 1878 he married Hannah, daughter of Baron Mayer de Rothschild. In 1892 he became secretary of state for foreign affairs under Gladstone, and in 1894 succeeded him as premier, which office he held until 1895.

**Rosecrans**, WILLIAM STARKE, an American general, was b. at Kingston, O., in 1819, graduated at West Point in 1842, and was employed as an engineer until 1854, when he resigned, became a civil engineer, and afterward engaged in coal mining and the manufacture of kerosene. In 1861 he volunteered as an aide to General McClellan, won an action at Rich Mountain in July, was commissioned brigadier general in the U. S. army, and succeeded McClellan as head of the Department of the Ohio, and kept Lee out of western Virginia. In 1862 he commanded a division at the siege of Corinth, and after its capture was given the command of the Army of the Mississippi; on September 19 he defeated Gen. Sterling Price at Iuka, and on October 3 and 4 he successfully defended Corinth against Price and Van Dorn. From October, 1862, to October, 1863, Rosecrans was in command of the Department of the Cumberland; in the battle at Stone River (December 31 and January 2), against Bragg, he by his personal exertions converted what had nearly been a defeat into

## Rosetta Wood

a victory, after each side had lost over 9,000 men; but at Chickamauga, Sept. 19-20, 1863, he was defeated by Bragg, with a loss of 16,179, although he held Chattanooga, and the Confederates lost 17,804 men. Rosecrans was relieved of his command by General Grant; but in 1864 he was placed over the Department of the Missouri, and repelled Price's invasion of that state. He received the brevet of major-general, and resigned from the army in 1867. In 1868-69 he was minister to Mexico, in 1881-85 a member of Congress, and in 1885-93 registrar of the treasury. D. March 11, 1898.

**Rosemary**, a shrubby, aromatic plant, a native of Southern Europe. It has but two stems; the leaves dark green, with a white



Rosemary.

under surface; the flowers are pale blue. At one time of considerable repute for medicinal purposes, rosemary is now esteemed chiefly for yielding, by distillation, the aromatic perfume known as oil of rosemary.

**Roses**, WARS OF THE, the fierce struggle for the crown of England between the Lancastrians (who chose the red rose as their emblem) and the Yorkists (who chose the white); it lasted with short intervals of peace for thirty years (1455-85), beginning with the battle of St. Albans and ending with Bosworth Field.

**Roset'ta** (Egyptian *Reshid*, the ancient *Bolbitine*), a city of Egypt, near the mouth of the Rosetta branch of the Nile, 30 mi. w. of Alexandria. Rosetta at one time enjoyed a large transit trade, which, however, has now been almost entirely diverted to Alexandria. The town is well built and attractive in appearance. Pop. 19,378.

**Rosetta Stone**, a tablet of black basalt, bearing an inscription in three versions (hieroglyphic, enchorial, and Greek) in honor of Ptolemy Epiphanes and belonging to about 196 B.C. It furnished the key for the deciphering of the hieroglyphic inscriptions. The stone, discovered by the French near Rosetta in 1799, is now in the British Museum.

**Rosetta Wood**, a handsome furniture wood,

## Rose Water

of an orange red color with very dark veins, imported from the East Indies. It is of durable texture, but the colors become dark by exposure. The tree yielding it is not known.

**Rose Water**, water tintured with roses by the process of distillation. The gathering of rose leaves for this purpose is quite an industry in the U. S.

**Rose Window**, a circular window, divided into compartments by mullions and tracery radiating from a center, also called Catharine wheel, and marigold window, according to modifications of the design. It forms a fine feature in the church architecture of the thirteenth and fourteenth centuries, and is mostly employed in the triangular spaces of gables. In France it is much used, and notwithstanding difficulties of construction, attained great size.

**Rosewood**, a wood so named because some kinds of it when freshly cut have a faint smell of roses. Most rosewood comes from Brazil, but it is also found in Honduras and Jamaica.

**Rosicrucians**, members of a secret society, the first account of which was published early in the seventeenth century in two books now generally ascribed to J. V. Andreae, a Lutheran clergyman of Württemberg. Many regard Andreae's writings as merely a veiled satire on his own times, and deny altogether the actual existence of any such society, in spite of the fact that since his day many persons (e.g., Cagliostro) have professed to belong to it. The aim of the Rosicrucians, or Brothers of the Rosy Cross, was said to be the improvement of humanity by the discovery of the "true philosophy," and they claimed a deep knowledge of the mysteries of nature, such as the permutation of metals, the prolongation of life, the existence of spirits, etc. According to Andreae the society was founded in the fourteenth century by a German baron named Rosenkreuz (i. e., "rosy cross"), who was deeply versed in the mysterious lore of the East, and who assembled the initiated in a house called the Sancti Spiritus Domus. The "secret" of the order, if it ever existed, has been faithfully guarded by its members; and the general cloud of mystery shrouding its history and objects has led to its being connected in public opinion with the Cabalists, Illuminati, etc. Some regard Rosicrucianism as the origin of freemasonry.

**Rosin**, the name given to the resin of coniferous trees employed in a solid state for ordinary purposes. It is obtained from turpentine by distillation. In the process the oil of the turpentine comes over and the rosin remains behind. There are several varieties of rosin, varying in color from the palest amber to nearly black, and from translucent to opaque. It differs somewhat according to the turpentine from which it is derived, this being obtained from numerous species of pine and fir. Rosin is a brittle solid, almost flavorless, and having a characteristic odor. It is used in the manufacture of sealing wax, varnish, cement, soap, for soldering, in plaisters, etc. Colophony is a name for the common varieties.

## Rosse

**Ross, ALEXANDER** (1783-1856), b. in Nairnshire, Scotland. He went to Canada in 1805; joined Astor's expedition to Oregon in 1810, and was afterward a fur trader in the Hudson's Bay service. He is the author of *Adventures of the First Settlers on the Oregon, Fur Hunters of the Far West*, and the *Red River Settlement*.

**Ross, SIR JAMES CLARK** (1800-1862), Arctic and Antarctic explorer, was b. in London. He entered the British navy at the age of twelve, accompanied his uncle Sir John Ross on his two voyages in search of a northwest passage, and in the interval between them accompanied Captain William Parry in his three Arctic voyages. He was promoted to the rank of post captain in 1834, particularly for the discovery of the north magnetic pole in 1831. He commanded the expedition in the *Erebus* and *Terror* to the Antarctic Ocean in 1839-43; and on his return published a narrative of that voyage, which had contributed largely to geographical and scientific knowledge generally. Captain Ross was knighted for his services, and received numerous other honors. In 1848 he made a voyage in the *Enterprise* to Baffin's Bay in search of Sir John Franklin.

**Ross and Cromarty**, two northern counties of Scotland, but generally treated of as one, the latter consisting merely of detached portions scattered over the former. They extend across the breadth of Scotland and include the island of Lewis and other islands. Area of the whole 2,003,065 acres, of which 220,586 are in Cromartyshire. Sheep farming and grazing are extensively carried on. There are no rivers of any size in either of the counties, but there are several fine lakes, the principal of which is Loch Maree, about 12 mi. long by 2 mi. broad. The principal towns: Dingwall, Stornoway, Cromarty, Invergordon, Tain, and Fortrose. Pop. 1891, 77,751.

**Rossbach** (ros' bâh), a village in the Prussian province of Saxony, between Naumburg and Merseburg, famous for the decisive victory which Frederick the Great obtained there, during the Seven Years' War, over the imperial and French troops under Marshal Soubise, Nov. 5, 1757.

**Rosse, WILLIAM PARSONS, THIRD EARL OF** (1800-1867), was b. at York. Though an M. P. from 1821, and afterward a representative Irish peer, Lord Rosse's chief attention was devoted to the study of practical astronomy. In 1827 he constructed a telescope, the speculum of which had a diameter of 3 ft., and the success and scientific value of this instrument induced him to attempt to cast a speculum twice as large. After innumerable difficulties, for every step had to be pioneered by experiment, and after many failures, Lord Rosse succeeded in 1845 in perfecting machinery which turned out the huge speculum, weighing 3 tons, without warp or flaw. It was then mounted in his park at Parsonstown, at a cost of \$150,000, on a telescope 54 ft. in length with a tube 7 ft. in diameter. A series of cranks, swivels, and pulleys enables this huge instrument to be handled almost with as much ease as telescopes of ordinary size. The sphere of



## Rossetti

observation was immensely widened by Lord Rosse's instrument, which has been chiefly used in observations of nebulae.

**Rossetti**, GABRIEL CHARLES DANTE (better known as Dante Gabriel) (1828-1882), painter and poet, was b. in London. He early showed a predilection for art, studied in the Royal Academy, then became a pupil of Ford Madox Brown; and in 1848 joined Holman Hunt, Thomas Woolner, Millais, and others in founding the so-called Pre-Raphaelite Brotherhood, to whose organ, the *Germ*, he contributed several poems. In 1849 he exhibited his painting of the *Girlhood of Mary Virgin*; but his later works, numerous as they were, were rarely seen by the public until the posthumous exhibition of a collection of his paintings in 1883 at the Royal Academy. His principal painting, are: *Dante's Dream*, the *Salutation of Beatrice*, the *Dying Beatrice*, *La Pia*, *Proserpine*, *Sibylla Palmifera*, *Monna Vana*, *Venus Verticordia*. Rossetti is even more famous as a poet. In both arts he appears as a devotee of mediævalism. His chief poems are the *House of Life*, a poem in 101 sonnets; the *King's Tragedy and other Ballads*, *Dante at Verona*, *Blessed Damozel*, etc. In 1861 he published the *Early Italian Poets*, a series of translations in the original metres, afterward reissued under the title of *Dante and his Circle*. His sister, CHRISTINA GEORGINA (1830), is a poetess of high merit. Her chief works are: *Goblin Market and other Poems* (1862), *The Prince's Progress and other Poems* (1866), *The Pageant and other Poems* (1881), besides prose stories, books for children, and several devotional works in prose and poetry. His brother, WILLIAM MICHAEL (b. 1829), an assistant secretary in the Inland Revenue office, has distinguished himself as an art critic and literary editor.

**Rossi**, GIOACHINO ANTONIO (1792-1868), Italian operatic composer, was b. at Pesaro. He wrote a great number of both comic and serious operas, the first successful one of which was *Tancredi* (1813), and enjoyed a high degree of reputation and wealth. In 1824 he visited London, and from 1824 till 1836 he resided at Paris, where he held, till 1830, a highly-salaried post in connection with the Théâtre des Italiens. He then spent some years at Bologna and Florence, but in 1855 he returned to Paris, where he d. His body was removed to Florence in 1887. His finest opera is *William Tell* (1829). Other chief works are: *Othello* (1816), and *Semiramide* (1823); and the comic opera, the *Barber of Seville* (1816).

**Rostock**, the largest town in Mecklenburg-Schwerin, Germany, is situated on the navigable Warnow, 7 mi. s. of the Baltic Sea and 60 mi. e.n.e. of Lübeck. Rostock, with the foreport of Warnemünde, carries on a fairly active but declining export trade (chiefly with England) in grain, and imports coals, timber, oil, and iron. It was the birthplace of Blücher. Pop. 39,374.

**Rostov** (or Rostof), a town of Southern Russia, in the government of Ekaterinoslav, on the Don, about 20 mi. above its mouth in the Sea of Azof. Its importance is due to an extensive

## Rotherham

grain-shipping industry, and trade in wool, oil, tallow, ores, pitch, etc. Pop. 61,256.

**Rot**, a disease incident to sheep (sometimes to other animals), and caused by the presence in the gall bladder and biliary ducts of the common liver fluke, developed from germs swallowed by the sheep with their food. The average length of the mature fluke is about 1 in. Within the liver of a single sheep several dozens of these parasites may sometimes be found. The disease is promoted by a humid state of atmosphere, soil, or herbage. It has different degrees of rapidity, but is almost invariably fatal.

**Rotation**, in physics, is the motion of a body about an axis, so that every point in the body describes a circular orbit, the center of which lies in the axis. It is thus distinguished from revolution, or the progressive motion of a body revolving round another body or external point. If a point, which is not the center of gravity, be taken in a solid body, all the axes which pass through that point will have different moments of inertia, and there must exist one in which the moment is a maximum, and another in which it is a minimum. Those are called the *principal axes of rotation*. When a solid body revolves round an axis its different particles move with a velocity proportional to their respective distances from the axis, and the velocity of the particle whose distance from the axis is unity is the *angular velocity of rotation*.

**Rotation of Crops**, in agriculture and horticulture, is the system or practise of growing a recurring series of different annual crops upon the same piece of land. The system is based on the fact that different crops absorb different quantities of the various inorganic constituents of the soil, thus impoverishing it for crops of the same kind, but leaving it unimpaired, or even improved, for crops feeding upon other constituents. Different soils and climates require different schemes of rotation, but it is a tolerably universal rule that culmiferous or seed crops should alternate with pulse, roots, herbage, or fallow. Where land is to be subjected to a crop of the same plants for a number of years, as in permanent pasture, the plants composing the crop should be of several different kinds, seeking a different kind of aliment; hence the propriety of sowing clover or ribwort among pasture grasses.

**Rothe** (rō'tê), RICHARD (1799-1867), German Protestant theologian. From 1823 till 1828 he was chaplain to the Prussian embassy at Rome. He afterward held various professorial posts at Wittenberg (1828-37), Heidelberg (1837-49), and Bonn (1849-54), and finally returned to Heidelberg, where he died. The work upon which his fame principally rests is his *Theologische Ethik*, a complete system of speculative theology, published in 1845-48 (2d ed. 1867-71).

**Roth'erham**, a municipal borough of England, in the West Riding of Yorkshire, 5 mi. n.e. of Sheffield, on the Don, at its junction with the Rother. It has an independent college, extensive iron works, and manufactures of soap, starch, glass, and ropes. Pop. 42,050.

## Rothschild

**Rothschild** (rôt'shilt; in English generally pronounced roths'child or ros'child), the name of a family of Jewish bankers, distinguished for their wealth and influence. The founder of the original banking house was Mayer Anselm Bauer (1743-1812), a poor orphan, b. in Frankfort-on-the-Main. Though educated as a teacher, Bauer entered a bank in Hanover, and finally saved sufficient capital to found a business of his own in the famous Judengasse of Frankfort, at the sign of the Red Scutcheon (Roth Schild), which afterward gave name to the family. He gained the friendship of the Landgrave of Hesse, who appointed him his agent, and in 1802 he undertook his first government loan, raising ten million thalers for Denmark. At his death in 1812 he left five sons, the eldest of whom, Anselm Mayer von Rothschild (1773-1835), became head of the firm in Frankfort, while the others established branches at various foreign capitals; Solomon Mayer (1774-1855) at Vienna, Nathan Mayer (1777-1836) in London, Karl Mayer (1788-1855) at Naples, and Jacob (1792-1868) at Paris. These branches, though in a measure separate firms, still conduct their operations in common; and no operation of magnitude is undertaken by any without a general deliberation of all at Frankfort. The Naples branch was discontinued in 1860; the two sons of Karl Mayer (Mayer Karl, 1820-86, and Wilhelm Karl) succeeding their childless uncle Anselm at Frankfort. The bold, yet skillful and cautious operations of the Rothschilds during the troubled political years after 1813 confirmed the fortunes of the firm. Nathan Mayer in particular distinguished himself by his energy and resource. By means of special couriers, carrier pigeons, swift sailing boats, etc., he was frequently in possession of valuable information (e. g., the result of the battle of Waterloo) even before the government, and skillfully turned his advantage to account. The Rothschilds do not condemn comparatively small operations; but they are chiefly famous for the enormous loans which they raise and manage for different European governments. In 1822 the five brothers were made barons by Austria; in 1885 Baron Nathaniel von Rothschild (1840-1905) was raised to the English peerage. Lionel Nathan (1808-79), the father of the last named, was the first Jew who sat in Parliament (1858); and various other members of the family have risen to positions of honor and dignity both in Britain and other countries. Pl. 32, Vol. IV.

**Rotifera** (Rotatoria, or Wheel Animalcules), a group of microscopic organisms, inhabiting both salt and fresh water, distinguished by the possession of an anterior disk-like structure. The popular name of "Wheel Animalcules" is derived from an apparent rotatory motion in the cilia which fringe the front disk. Rotifera are found both in a free swimming and a temporarily or permanently attached state; some are parasitic. The body is usually elongated and generally covered with a chitinous skin. The head region is well marked. A highly-specialized digestive system

## Rouen

is usually developed, at least in the females. The nervous system is represented by a single ganglionic mass, on which pigment spots, supposed to be eyes, are generally visible. The sexes are found in different individuals; but the males are smaller, and in development entirely subsidiary to the females. Locomotion is carried on by means of the cilia of the trochal disk, which also serve to sweep particles of food toward the mouth. The first rotifer was discovered in 1702 by Leeuwenhoek; but Ehrenberg and later observers first differentiated them from infusoria and other minute forms of life.

**Rotten Stone**, a soft stone or mineral, called also *Tripoli*, from the country from which it was formerly brought. It is much used for polishing household articles of brass or other metal. Most of the rotten stone of commerce is derived, as that of Albany, N. Y., from the decomposition of siliceous limestones, the lime being decomposed, and the siliceous remaining as a light, earthy mass.

**Rotterdam**, the chief port and second city in Holland, is situated on the Nieuwe Maas or Meuse, at its junction with the Rotte, about 14 mi. from the North Sea. The town is intersected by numerous canals, which permit large vessels to moor alongside the warehouses in the very center of the city. Rotterdam contains shipbuilding yards, sugar refineries, distilleries, tobacco factories, and large machine works; but its mainstay is commerce. It not only carries on a very extensive and active trade with Great Britain, the Dutch East and West Indies, and other transoceanic countries, but, as the natural outlet for the entire basin of the Rhine and Meuse, it has developed an important commerce with Germany, Switzerland, and Central Europe. The Maas is crossed by a great railway bridge and another for carriages and foot passengers. Pop. 209,136.

**Rotti** (or Rottee), one of the Dutch Sunda Islands, separated from the s.w. end of Timor by the Rotti Strait; 5 mi. wide; area 385 sq. mi.; pop. about 70,000, ruled by native chiefs under the Dutch resident.

**Roubaix** (rö-bä), a town of France department Nord, 6 mi. n.e. of Lille, is a highly important seat of the French textile industry, remarkable for its rapid growth, most of it being not more than fifty years old. Woolens, cottons, and silk or mixed stuffs are chiefly made; also beet sugar, machinery, etc. Pop. 114,917.

**Rouen** (rö-än), the old capital of Normandy, now chief town of department Seine-Inférieure, in France, is situated on the Seine, 80 mi. from the sea and 87 mi. n.n.w. of Paris. It is the seat of an archbishop, and the fourth port in France. The municipal library has 120,000 volumes and 2,500 MSS. Rouen is a busy trading place, and has important manufactures of *rouenneries* (a kind of coarse striped or checked fabric) and other cotton goods. It has also manufactures of chemicals, beet-root sugar, earthenware, confectionery, etc.; and bleach fields, dye works, foundries, etc. The channel of the Seine has been deepened and

## Rouge

regulated, so that vessels of 21 ft. draught can ascend to the extensive harbor and docks. Corneille, Fontenelle, Géricault, and other famous men were natives of Rouen. Pop. 112,352.

**Rouge** (rözh), a very fine scarlet powder, used by jewelers for polishing purposes, and prepared from crystals of sulphate of iron exposed to a high temperature. The name is also given to a cosmetic prepared from safflower (which see).

**Rouge-et-Noir** (rözh-é-nwâr) (Fr. "red and black"), Trente-Un (tränt-ûp, "thirty-one"), or Trente et Quarante (tränt-é-kâ-ränt; "thirty and forty"), a modern game of chance played with the cards belonging to six complete packs. The punters or players stake upon any of the four chances; *rouge*, *noir*, *couleur*, and *inverse*. The banker then deals a row of cards for noir, until the exposed pips number between 30 and 40 (court cards count 10, aces 1), and a similar row for rouge. The row wins which most nearly approaches the number 31, and players staking on the winning color receive their stake doubled. *Couleur* wins if the first card turned up in the deal is of the winning color; in the contrary case *inverse* wins. When the number of pips in both rows are equal it is a *refait*, and a fresh deal is made; but if both happen to count exactly 31 it is a *refait de trente-et-un*, and the banker claims one half of all stakes. This last condition places the banker at an advantage calculated to be equal to about 1½ per cent. on all sums staked.

**Roulette** (rö-let'); (Fr. "little wheel"), a game of chance, in which a small ivory ball is thrown off by a revolving disc into one of 37 or 38 compartments surrounding it, and numbered from one to thirty-six, with one or two zeros. Players who have staked upon the member of the compartment into which the ball falls receive thirty-six times their stake; less if they have staked upon more than one number. There are also other chances on which stakes may be placed.

**Rouma'nia**, a European kingdom, bounded by Austria-Hungary, Servia, Bulgaria, the Black Sea, and Russia; area 50,760 sq. mi. It includes the former Danubian principalities of Walachia and Moldavia and the province of the Dobrudsha. Population in 1899, 5,912,520. The capital is Bucharest; other chief towns are Jassy, Galatz, Braïla, and Giurgevo. The climate is much more extreme than at the same latitude in other parts of Europe; the summer is hot and rainless, the winter sudden and very intense; there is almost no spring, but the autumn is long and pleasant. Roumania is an essentially agricultural and pastoral state, fully 70 per cent. of the inhabitants being directly engaged in husbandry. The chief cereal crops are maize, wheat, barley, rye, and oats; tobacco, hemp, and flax are also grown; and wine is produced on the hills at the foot of the Carpathians. Cattle, sheep, and horses are reared in large numbers. Excellent timber abounds on the Carpathians. Bears, wolves, wild boars, large and small game, and fish are plentiful. The country is rich in minerals of nearly every description, but salt, petroleum,

## Roumania

and lignite are the only minerals worked. Manufactures are still in a rudimentary state.

The chief exports are corn, cattle, timber, and fruit; the chief imports manufactured goods, coal, etc. Germany, Great Britain, and Austria-Hungary appropriate by far the greatest share of the foreign trade, the bulk of which passes through the Black Sea ports. In 1887 the exports were valued at \$53,145,000, the imports at \$62,926,500. Railways, begun in 1869, have a total length of 1,600 mi., nearly all in the hands of government, which also monopolizes salt and tobacco. The French decimal coinage has been introduced, the franc being called *leu* (pl. *lei*), the centime *ban*. The metric system of weights and measures has also been officially recognized, but a bewildering diversity of local standards is still common.

**People.**—The Roumanians, who call themselves *Romani*, claim to be descendants of Roman colonists introduced by Trajan; but the traces of Latin descent are in great part due to a later immigration, about the twelfth century, from the Alpine districts. Their language and history both indicate that they are a mixed race with many constituents. Their language, however, must be classed as one of the Romance tongues, though it contains a large admixture of foreign elements. In Roumania there are about 4,500,000 Roumanians, 400,000 Jews, 200,000 gypsies, 100,000 Bulgars, 50,000 Magyars, 50,000 Germans, 15,000 Greeks, and 15,000 Armenians. Three fourths of the population are peasants, who until 1864 were kept in virtual serfdom by the boyars or nobles. In that year upward of 400,000 peasant families were made proprietors of small holdings averaging 10 acres, at a price to be paid back to the state in fifteen years. About 4½ million of the people belong to the Greek Church. Energetic efforts are being made to raise education from its present low level. Roumania has two universities (at Bukarest and Jassy), several gymnasia, and a system of free primary schools, at which attendance is compulsory.

**Government, etc.**—Roumania is a hereditary constitutional monarchy, with a bicameral legislature. The senate consists of various dignitaries and officials and 110 elected members; the chamber of deputies has 183 members, elected by all citizens paying taxes or possessed of a certain standard of education. The constitution, revised in 1884, closely resembles that of Belgium. The king is assisted by a ministry of eight members. The army is modeled on the German system, service being compulsory from the age of 21 to 46. The standing army has a peace strength of 1,300 officers and 45,000 men, with 192 cannon. In addition are the territorial army (67,000 men), the militia (47,700 men), and the *glota* or *levée en masse*. The navy consists of 21 vessels, mostly small. Every Roumanian between the ages of seventeen and forty-six is liable to serve in one or other of the above bodies. For 1891-92 the revenue was estimated 169,738,000 lei, the expenditure the



## Roumania

same. In 1892 the public debt was 968,804,-728 lei, one half of which was incurred for railways and other public works.

**History.**—The country that is now Roumania was anciently part of Dacia, which was conquered by Trajan and made a Roman province in 106 A.D., a great many Roman colonists being then settled in it. In the third century it was overrun by the Goths, and subsequently by Huns, Bulgars, Avars, and Slavs, all of whom have left more or less distinct traces on the land and people. At the beginning of the ninth century Roumania formed part of the great Bulgarian kingdom, after the fall of which in 1019 it nominally belonged to the Eastern Roman Empire, although soon taken possession of by Turkish tribes. Walachia and Moldavia were long divided. About 1241 Radu Negra, "duke" of Fogaras, is said to have founded a voivodeship in Walachia, which finally fell under Turkish supremacy after the battle of Mohacs in 1526. The bolars retained the nominal right of electing the voivodes until 1726; but thenceforward the sultan openly sold the office to the highest bidders, who, without security of tenure, mercilessly plundered the unfortunate province so long as their power lasted. In Moldavia, Dragosh or Bogdan about 1354 founded a kingdom, much as Radu had done in Walachia, and it too fell under the overlordship of the Porte after the death of the voivode Stephen the Great in 1504. The Turks subsequently introduced the same custom of selling the hospodarship or voivodeship. In both provinces the government was most frequently purchased by Phanariotes, Greek inhabitants of the Phanar district of Constantinople. The successive wars between Russia and Turkey, the first of which began in 1768, were on the whole beneficial to Roumania, for the Russians gradually established a kind of protectorate over their fellow Christians on the Danube. The treaty of Paris in 1856, after the Crimean War, confirmed the suzerainty of the Porte, but preserved the rights and privileges of the Danubian principalities, and added to them part of Bessarabia. In 1858 the two provinces, each electing Colonel Couza as its hospodar, were united by a personal union, which in 1861 was formally converted into a real and national union. Couza, who assumed the title of Prince Alexander John I in 1860, was forced by a revolution to abdicate in 1866, and Prince Charles of Hohenzollern-Sigmaringen, the present Carol I, was elected in his place. In the Russo-Turkish War of 1877-78 Roumania sided with Russia, and proclaimed its independence of Turkey. This claim was recognized by the Treaty of Berlin in 1878, but Roumania was compelled to retrocede to Russia the part of Bessarabia which it acquired at the close of the Crimean War, and to receive the Dobrudsha in exchange. In 1881 the principality declared itself a kingdom.

**Rounders,** a game played with a bat and a ball by two parties or sides, on a piece of ground marked off into a square or circle, with a batter's station and three goals all at equal

## Round Towers

distances. On the ball being thrown toward him the batter tries to drive it away as far as he can and run completely round the goals, or over any one of the four parts, before the ball can be thrown back to the batting station. The batter is declared out if he fails to secure a run after having had three balls, if a fielder returns the ball so as to strike him while running, or if the ball from his bat is caught in the air by one of the fielders.

**Round Fish,** a fish of the salmon family, found in many of the lakes and rivers of the Northern U. S. and Canada. When in good condition it is very fat and of exquisite flavor, weighing about 2 lbs.

**Roundheads,** a name formerly given by the Cavaliers or adherents of Charles I, during the English civil war, to members of the Puritan or Parliamentary party, who distinguished themselves by having their hair closely cut, while the Cavaliers wore theirs in long ringlets.

**Round Table, THE,** famous in the Arthurian legends, a table for the accommodation of a select fraternity of knights, said to have been established by Uther Pendragon, father of King Arthur, and when it was complete to have had 150 knights of approved valor and virtue. King Leodegrance, who received it from Uther Pendragon, was father of Guinevere, and assigned it as part of her dowry when she wedded Arthur. The fellowship of the Round Table met for the last time just before setting out on the quest for the Holy Grail. There are other accounts of the founding of the table, one of which ascribes it to Arthur himself, who admitted only 12 knights to it. All, however, unite in describing it as the center of a fellowship of valiant, pious, and noble knights. First mention of it is made in the *Brut of Wace*.

**Round Towers,** a class of tall, narrow, circular edifices, tapering somewhat from the base upward, and generally with a conical top, from 60 to 130 ft. in height, and from 20 to 30 in diameter. With the exception of three in Scotland, they are peculiar to Ireland. The doors are from 6 to 20 ft from the ground, the windows small. The interior contained no stairs, but the successive stories were reached, like the doors, by means of ladders. Authorities are now pretty well agreed that these towers were works of a Christianized race, erected as places of refuge and as watch-towers. They date from the eighth or ninth to the thirteenth century.

**Rousseau, JEAN JACQUES** (1712-1778), one of the most celebrated and most influential writers of the eighteenth century. For the first thirty-five years of his life the chief authority is his own painfully frank, but perhaps not absolutely accurate *Confessions*, first published in 1782 and 1789. His youth gave little promise of his future eminence, and after a desultory education he was apprenticed in 1725 to an engraver, from whose real or fancied severity he ran away in 1728. He now fell under the notice of Madame de Warens, a lady residing at Annecy, who sent him to a Roman Catholic institution at Turin, where he abjured Prot-



# ARTISTS

Raphael  
Murillo

Titian  
Rembrandt

LIBRARY  
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## Rovigo

estantism. After several fits of eccentric wandering he went to live with Mme. de Warens at Les Charmettes, a country-house near Chambéry, where they appear to have lived happily for nearly three years. In 1741 he went to Paris, and in 1743 obtained the post of secretary to the French ambassador at Venice. This office he threw up, and returned to Paris in 1745, to lead a precarious life, copying music and studying science. About this time he became intimate with Diderot, Grimm, D'Holbach, Mme. D'Epinay, etc., and contributed to the *Encyclopédie*; and from this period also dated his connection with Thérèse le Vasseur, with whom, five-and-twenty years later, he went through some form of marriage ceremony. In 1750 his essay, in which he adopted the negative side of the question whether civilization has contributed to purify manners, won a prize offered by the Academy of Dijon, and brought him for the first time into general notice. In 1752 he brought out a successful operetta (the music by himself), and soon after a celebrated *Letter on French Music*. In 1754 he revisited Geneva, where he was readmitted a free citizen on once more embracing Protestantism. Having returned to Paris he wrote a sort of novel, *Julie ou La Nouvelle Héloïse*, which was published in 1760, being followed, by *Le Contrat Social*, a political work, and *Emile ou de l'Éducation*, another story, in 1762. Persecution, exaggerated by his own morbid sensibility, forced Rousseau to flee to Neuchâtel, then to the Ile St. Pierre in the Lake of Bienne, and finally to England, where he was welcomed by Hume, Boswell, and others in 1766. A malicious letter by Horace Walpole unluckily roused his suspicions of his English friends, and in May, 1767, he returned to France, where his presence was now tolerated. He lived in great poverty, supporting himself by copying music and publishing occasional works. In May, 1778, he retired to Ermenonville near Paris, where he d. in the following July; not without suspicion of suicide. His celebrated *Confessions* appeared at Geneva in 1782. The chief importance of his works lies perhaps in the fact that they contain the germ of the doctrines which were carried out with such ruthless consistency in the French Revolution. Rousseau was also a musical author and critic of some importance.

**ROVI'GO**, a town in Italy, 23 mi. s.w. of Padua, capital of a province of its name, on the Adigetto, an arm of the Adige. The town house contains a picture gallery and a library of 80,000 vols. There is a handsome courthouse and two leaning towers belonging to a castle erected in the tenth century. Pop. 7,272. The province has an area of 651 sq. mi.; pop. 217,700.

**Rowan Tree** (Roan Tree, or Mountain Ash), is a native of Europe and Siberia, common in the U. S. and Great Britain, particularly in the highlands. Its leaves are pinnate, leaflets uniform, serrated, glabrous. It has numerous white flowers in corymbs. The fruit consists of clusters of small red berries, bitter to the taste. The tree attains a height of from 20

## Rowing

to 40 ft., and affords timber much used by tool makers and others. The bark is used by tanners and the berries yield a dye. The rowan tree was formerly regarded as an object of pa



Rowan in flower.

culiar veneration, and a twig of it was supposed to be efficacious in warding off evil spirits. It is also called *quicken tree* and *quick beam*.

**Rowing** is the art of propelling a boat by means of oars, which act as levers of the second order, the work being done between the power (i.e., the rower) and the fulcrum (i.e., the water, of which the actual displacement is very slight). That part of the operation during which the power is actually being applied, i.e., when the oar is in the water, is specifically called the stroke; while feathering is the act of turning the blade of the oar so as to be parallel to the surface of the water, and carrying it thus through the air into position to repeat the stroke. Technically the word "rowing" is used by boating men only when each oarsman has but a single oar; when he has one in each hand he is said to "scull," and the oars are called "sculls." Although rowing is certainly one of the most ancient methods of propelling vessels, it has only comparatively recently come into prominence as a form of sport. Boat racing practically dates from the first quarter of the nineteenth century, and its development has lain almost entirely in the hands of the Anglo-Saxon races. The Thames has always been the leading resort of amateur oarsmanship, which had attained some little vigor before the first boat race between Oxford and Cambridge Universities took place in 1829. The second took place in 1836; and since 1856 the contest has been annual, the course (since 1864) being from Putney to Mortlake, about 4½ mi. Of the very numerous amateur regattas which are held all over Great Britain, the chief is that at Henley-on-Thames, held annually since 1839. In Great Britain rowing affairs for amateurs are now generally conducted under the rules of the Amateur Rowing Associa-

## Rowley Regis

**Rowing**, founded in 1879, and recognized by all the chief clubs. In the U. S. the first amateur rowing club was founded in 1834, but the sport did not make much progress until the Universities of Yale (in 1843) and Harvard (in 1844) took it up, followed by other universities. The chief regatta is held on different courses in different years by the National Association of Amateur Oarsmen, founded in 1873. Holland, Germany, and other countries have rowing clubs of importance; and foreign oarsmen have competed from time to time at British regattas, without, however, great success. Racing boats are called eight-oared or "eights," "fours," "pairs," etc., according to the number of rowers. "Sixes," and "double scullers" are commoner in America than in Great Britain. The use of outriggers was introduced about 1844, that of sliding seats, an American invention, about 1871.

**Rowland**, Prof. Henry A., LL.D. (1848–1901), a distinguished scientist; b. at Honesdale, Penn., Nov. 27, 1848; educated at Rensselaer Polytechnic Institute at Troy, N. Y. He was elected professor of physics in Johns Hopkins University in 1876, and held the position until his death. He became widely known through his inventions. He was the originator of the multiple telegraph instrument, and also succeeded in making the most perfect photographs of the solar spectrum ever secured.

**Rowley Regis**, a town of Staffordshire, England, partly within the parliamentary borough of Dudley, and engaged in similar industries. Pop. 1891, 30,791.

**Roxburgh** (Roxburghshire, or Teviotdale), an inland border county of Scotland, is bounded by Dumfries, Cumberland, and Northumberland, Berwick, Midlothian, and Selkirk. Total area 428,493 acres, of which about 190,000 are under crops. The minerals are unimportant, though limestone and sandstone are abundant. Roxburghshire is chiefly occupied by valuable sheep walks, but its arable farms are also among the best in Scotland. The important woolen manufacture is confined to the towns, of which the chief are Hawick (county town), Galashiels (partly in Selkirkshire), Jedburgh, Kelso, and Melrose. Pop. 53,726.

**Royal Institution of Great Britain**, founded in 1799, incorporated by royal charter in 1800, for diffusing knowledge and facilitating the general introduction of mechanical inventions, and for teaching the application of science to the common purposes of life. The members are elected by ballot, and pay an admission fee and annual subscription. The buildings at Albemarle St., Piccadilly, London, contain a laboratory, library, and museum, and among the lecturers occur the names of Dr. Thomas Young, Sir Humphry Davy, Faraday, Tyndall, Lord Rayleigh, Huxley, Carpenter, and other eminent men.

**Royal Society** (London) **THE**, the oldest learned society out of Italy, was founded for the study and promotion of natural science, in 1660. Meetings are held weekly from November to June, for the purpose of reading and discussing scientific papers; and the more im-

## Rubber Making

portant of these are published in the annual *Philosophical Transactions*, first issued in 1665, and now forming a most valuable series. Accounts of the ordinary meetings, with abstracts of papers, etc., appear also in the periodical *Proceedings*, begun in 1800. Scientific research has at all times been both initiated and encouraged by the Royal Society, and many of the most important scientific achievements and discoveries have been due to its enlightened methods. It deservedly enjoys an influential and semi-official position as the scientific adviser of the British government, and not only administers the £4,000 annually voted by Parliament for scientific purposes, but has given suggestions and advice which have borne valuable fruit, from the voyage of Captain Cook in the *Endeavor* in 1768 down to the *Challenger* expedition, more than a century later. The society has an independent income from property of less than £5,000, besides the annual subscriptions of £4 from each fellow. It awards the Copley, Davy, and two royal medals annually, and the Rumford medal biennially, for distinction in science; the first being the blue riband of scientific achievement, and bestowed both on foreign and British savants. The roll of the Royal Society contains practically all the great scientific names of its country since its foundation. Among its presidents have been Lord-chancellor Somers, Samuel Pepys, Sir Isaac Newton, Sir J. Banks, Sir Hans Sloane, and Sir Humphry Davy.

**Royal Society** (Edinburgh), a society founded and chartered in 1783 for the promotion of all branches of physical and literary research, but now almost wholly engrossed with physical science. Its meetings are held twice a month from November to June, and the more important papers then read are published in the *Quarterly Transactions*, and abstracts of them in the occasional *Proceedings*. The society receives £300 annually from government, but its chief funds are derived from the subscriptions of the fellows. It meets in apartments leased from government in the Royal Institution buildings. The library is chiefly scientific. The chief promoter of the society was Principal Robertson, the historian; among its early members were Hume, Reid, Edmund Burke, Hutton, Dugald Stewart, and James Watt; and among its presidents have been Walter Scott, Sir David Brewster, the Duke of Argyll, Lord Moncreiff, and Sir William Thomson.

**Rshev**, a town of Russia, government of Tver, on the Volga, carrying on a large river traffic and hemp spinning. Pop. 35,810.

**Rubber**. See *India-rubber*.

**Rubber Making**.—The sap from the rubber tree is poured into basin-like vessels and taken to the huts where the gum is to be cured. This is done by smoking the gum over a furnace in which is burned the nuts of a species of palm. The nuts make a dense smoke which pours out of the neck of the furnace. The workman dips a wooden paddle into the rubber sap and to this clings a thin layer of the sticky juice. The gum-smeared paddle

## Rubber Making

is held and turned in the smoke until the water in the sap evaporates, when the paddle is dipped into the sap again. This operation is repeated until the gum forms a large lump on the paddle about the size of a man's head. This is cut from the wood, and after the ball of gum has been exposed to the sun for a time to complete the drying, it is piled up with others to be shipped away.

The india-rubber manufacturer first cleans the rubber, for bits of leaves, pieces of bark, earth, stones and other foreign substances are mixed with it. This is done by means of a "washing machine," which consists of a pair of toothed rollers, over which a perforated water pipe hangs. The crude rubber is cut, squeezed, and mashed between the rollers, and a spray of water carries off the impurities. The rubber comes from the washing machine in irregular strips, rough as bark. The mixing machine, to which the rubber is taken next, has a pair of steel rollers, over which is a box filled with the compound which the rubber-maker mixes with the pure rubber. It is at this stage of the manufacture that the old overshoes, arctics, garden hose, etc., are mixed in. In the compound also is the sulphur which "vulcanizes" the rubber and gives it the preservative qualities. The washed rubber mechanically combines with the composition in the mixing machine, and it is then either taken to the rolls where the rubber is coated on duck, or to the machine which kneads the rubber preparatory to pressing it into molds. At no stage of the process is the rubber ever melted. It is warmed up at times, but molded solid rubber goods are pressed into molds, not poured in. A large proportion of the rubber goods consists of duck or canvas coated with rubber. This is done in a friction machine, which consists of iron or steel rolls placed one over the other, in which the duck and rubber are pressed together. As the duck passes between the rollers the sheet of rubber is laid on top and is pressed into the duck. The pressure is so great that the duck and rubber become almost one material.

Hose is made in fifty foot lengths from two to ten ply, and it is all made on iron mandrels, or rods, which are the same size as the inside diameter of the hose. A strip of pure rubber fifty feet long and just wide enough to double around the mandrel, is first wrapped around the iron rod, and, as the fresh-cut edges are touched with naphtha, the rubber unites and forms a pure rubber pipe, which is afterward the inside of the hose. The rubber coated duck is next wrapped around the pure rubber pipe which is still on the mandrel; if the duck is wrapped around twice it is two-ply, if four times it is four-ply, etc. The duck is wrapped around the mandrel by machinery, and small rollers press the edge of the duck so that every inch is subjected to pressure. Another strip of pure rubber is then put around the duck for the outside, and the hose still on the mandrel is put in the "heater." Steam is admitted to the heater, and the sulphur in the compound becomes mechanically united with the rubber,

## Rubicon

and the rubber is "vulcanized." The hose is kept in the heater for a half to three quarters of an hour, and then it is taken from the mandrel. Air is admitted between the hose and the mandrel, and the hose, expanded by the air, slips off easily.

Rubber belting for machine shops and factories is made from rubber coated duck. Rubber bands sold by stationers are cut from pure rubber hose which is placed in a mandrel on a lathe. As it revolves, a knife-cuts off sections of the hose, and these narrow sections are the rubber bands. The large perforated rubber mats which cover the floors of halls and rotundas in business blocks are cut out by hand. The thick rubber sheet is laid on a block, and with different shaped dies the pattern is punched out.

**Ru'bens**, PETER PAUL (1577-1640), the most eminent painter of the Flemish school. His bent toward painting early revealed itself, and under his first masters, Verhaegt, Adam Van Noort, and Otto Van Veen, he made rapid progress, and in 1598 was admitted as a master of the guild of painters in Antwerp. In 1600 he went to Italy, where he remained till 1608, chiefly at the court of the Duke of Mantua. On his return to the Netherlands his reputation was already great, and the Archduke Albert attached him to his court, with a salary of 500 livres. Rubens married his first wife, Isabella Brant, in 1609, and settled down in Antwerp to a successful and brilliant career, his studio crowded with pupils, to whose assistance, indeed, his detractors attributed the surprising number of pictures he turned out. In 1621 he was employed by Marie de' Medici to design for the gallery of the Luxembourg the well known series of magnificent allegorical pictures illustrating the life of that princess. After the death of his wife in 1626 he was employed by the Archduchess Isabella in endeavoring to arrange a truce between Spain and the Netherlands; in 1628 he was engaged in the important private negotiations of a peace between Spain and England, in the course of which he visited Madrid and England (in 1629). He was knighted by Charles I, and his brush, never idle either in Madrid or London, decorated the ceiling of the banqueting house at Whitehall. In 1630 he married Helena Fourment, who appears in many of his later works, and settled once more in Antwerp, where he continued to produce numerous pictures until his death in May, 1640. Rubens was indisputably the most rapid of the great masters, and was remarkable for his fondness for large canvases. His great characteristics are freedom, animation, and a striking brilliancy and disposition of color. The *Descent from the Cross* in Antwerp Cathedral is generally considered his masterpiece. His pictures number upward of 2,000 exclusive of about 500 drawings, a few etchings, etc.

**Ru'bicon**, a river in North Italy (now the Fiumicino, a tributary of the Adriatic), famous in Roman history, Cæsar having by crossing this stream (49 B.C.), at that time regarded as the northern boundary of Italy, finally com-



## Rubidium

mitted himself to the civil war. Hence the phrase "to pass the Rubicon" is to take the decisive step by which one commits one's self to a hazardous enterprise.

**Rubidium**, a rare metal discovered by Bunsen and Kirchhoff in 1860, by spectrum analysis; symbol Rb, atomic weight 85.4. It is a white, shining metal, and at ordinary temperatures is as soft as wax. It is usually found in connection with cesium, and belongs to the group of the alkali metals.

**Rubinstein**, ANTON GRIGORYEVITCH (1829-1894), a Russian composer and pianist. In 1839 he made an extensive European tour, playing on the piano to enthusiastic audiences; and in 1842 he visited England. He then studied for eighteen months in Paris; studied and taught at Berlin and Vienna; and returned to Russia in 1848, where he devoted himself to further study and to composing until 1856. On his reappearance in the concert room his fame was at once assured by his phenomenal skill on the pianoforte, and his numerous tours have formed a series of unbroken successes. In 1858 he established his headquarters at St. Petersburg, and assisted largely in the foundation of the St. Petersburg Conservatoire in 1862, of which he was principal until 1867. In 1869 he was ennobled by the czar. In 1872 he made a concert tour of the U. S. As a composer Rubinstein has been exceedingly prolific, being especially successful in his pianoforte pieces. His operas have had but a qualified success. Perhaps his best known work is the *Ocean Symphony*.

**Ruble**, a silver coin, the standard of money in Russia, with a legal weight (since Jan. 1, 1886) of 19.99 grammes, equal to about 77.2 cts. of U. S. money. A ruble is divided into 100 copecks. Half and quarter rubles and smaller silver coins are also issued; but in actual circulation there is little but paper money, current at about 30 per cent. below its nominal value. The gold imperial is worth 10 rubles, the half-imperial 5 rubles.

**Ruby**, a precious stone of a deep red color, of which there are two varieties — the oriental and the spinel. The oriental ruby or true ruby is a corundum formed nearly exclusively of alumina, of great hardness, and the most valuable of all precious stones. A ruby of five carats, if perfect in color, is said to be worth ten times as much as a diamond of the same weight. Oriental rubies are found chiefly in Burmah and Siam; inferior specimens have also occurred in North America and Australia. Spinel rubies consist of an aluminate of magnesium, and are much inferior to the true rubies in hardness and value. They are found in Burmah, Ceylon, and Australia. A lighter colored variety, discovered in Badakshan, is known as the balas ruby.

**Ruby Throat**, a species of humming-bird, so named from the brilliant ruby red color of its chin and throat. In summer it is found in all parts of North America, up to 57° n. lat., being thus remarkable for its extensive distribution.

**Rudder Fish**, a fish allied to the mackerel,

## Rugby

very common in the Atlantic and Pacific oceans, so named from its habit of swimming around the sterns of ships, attracted, doubtless, by the refuse thrown overboard. The flesh is said to be coarse in flavor.

**Ruddiman**, THOMAS, a celebrated Scottish scholar, was b. in 1674 in Boyndie parish, Banffshire, where his father was a farmer. He graduated at Aberdeen University in 1694, and became schoolmaster at Laurencekirk. About 1700 he removed to Edinburgh, where he obtained the post of assistant in the Advocates' Library. His best known work is his famous *Rudiments of the Latin Tongue* (1714), a book which immediately superseded all previous treatises of a similar kind, and long remained in use in the schools of Scotland. In 1715 he edited the first collected edition of George Buchanan's works, with severe strictures dictated by his own Jacobite leanings.

**Rudini**, ANTONIO DI, b. in Sicily in 1839. In 1869 he was chosen minister of the interior, and was deputy from Canicatti in 1882. He formed a new parliamentary group known as Young Rights, and became prime minister of Italy in 1891. He retired in May, 1892. In 1896 he became president of the council and minister of the interior.

**Ruff**, a bird belonging to the waders, length, 10½ to 12½ in.; plumage, which varies greatly in



Ruff.

color, generally variegated brown on back and wings, white on belly. In the breeding season the male has its neck surrounded by long plumes, which when raised form a kind of tippet or ruff, whence its name. The scientific name ("pugnacious fighter") is derived from its pugnacious habits at the same season. The females are called *reeves*. These birds nest in swamps; the eggs, three or four in number, are pale green, blotched with brown. The ruffs are birds of passage, and are often killed on Long Island.

**Rugby**, a town in Warwickshire, England, on the Avon, 15 mi. n.e. of Warwick, is an important railway junction and the seat of a famous boys' school, one of the great "public schools," founded in 1567, of which Dr. Arnold became head master in 1828, and had as successors Tait, afterward archbishop of Canter-

## Rügen

bury, and Temple, bishop of London. The number of pupils is about 400. The town has some handsome churches, a townhall, and a number of charities. Pop. 11,262.

**Rügen** (rü'gen), an island in the Baltic belonging to Prussia, near the coast of Pomerania; area 377 sq. mi.; exceedingly irregular in shape. The surface is fertile, undulating, and in many places covered with beautiful beech forests. The Stubbenkammer, a sheer chalk cliff (400 ft. high) at the northeast extremity, is frequently visited. The capital is Bergen. Many of the coast villages are popular sea-bathing resorts. From 1648 till 1815 Rügen belonged to Sweden. Pop. 45,039.

**Rule Nisi** (or Rule to Show Cause), in English and American law, an order granted by the court on an interlocutory application (formerly always *ex parte*), directing the party opposed to the applicant to do or abstain from some act, unless (*nisi*) he can *show cause* why the order should not be obeyed. If cause is shown the order is "discharged;" otherwise it is made "absolute," and the party ruled must obey on pain of attachment for contempt.

**Rule of Three**, **THE**, an application of the doctrine of proportion to arithmetical purposes by which we are enabled to find a fourth proportional to three given numbers, that is, a number to which the third bears the same ratio as the first does to the second. The rule is divided into two cases, *simple* and *compound*; now frequently termed *simple* and *compound proportion*. *Simple proportion* is the equality of the ratio of two quantities to that of two other quantities. *Compound proportion* is the equality of the ratio of two quantities to another ratio, the antecedent and consequent of which are respectively the products of the antecedents and consequents of two or more ratios.

**Rum**, the liquor obtained by distillation from the skimmings and the molasses formed in the manufacture of cane sugar. The pure distilled spirit is colorless, and receives its brown tint from the addition of caramel. Rum is obtained chiefly from the West Indies and British Guiana; the best sort is named Jamaica rum, no matter where manufactured. Pine apple rum is ordinary rum flavored with sliced pine apples; tafia is an inferior French variety of rum.

**Rume'lia** (or Ru'mili) (land of the Romans), a former political division of Turkey in Europe, comprising ancient Thrace and part of Macedonia, and including Constantinople and Salonica.

**Ruminants** (or Ruminantia), a group of herbivorous mammals. The faculty of rumination, though it gives name to this order, is not quite peculiar to it. Ruminants are distinguished from other orders by certain peculiarities of dentition. The most typical of the group, the ox, sheep, antelope, etc., have no incisor or canine teeth in the upper jaw, but have instead a hardened or callous pad against which the six lower incisors bite. In the lower jaw are two canines quite similar to the incisors, and the Camelidæ and Tragulidæ possess also

## Runes

upper canines. In both jaws are six grinding teeth on either side, separated by an interval from the front teeth. The feet of ruminants are cloven. Horns, developed in pairs, are present in the majority of the species; either solid, as in the antlers of the true deer, or hollow as in the horns of the ox, etc. The alimentary canal is very long. The stomach is divided into four compartments, frequently spoken of as four stomachs. The first and largest (*rumen* or *paunch*) receives the food roughly bruised by the first mastication, and transmits it to the second (*reticulum* or *honeycomb*), whence it is sent back in pellets to the mouth to be rechewed. This second mastication is called "chewing the cud." The food is then reswallowed into the third stomach (*psalterium*, *omosum* or *manyplies*), and passes finally into the true digestive cavity (*abomasum*). Fluids may pass directly into any part of the stomach. In young ruminants, which feed upon milk, the first three "stomachs" remain undeveloped until the animal begins to take vegetable food. Most of the ruminants are suitable for human food. They are generally gregarious, and are represented by indigenous species in all parts of the world except Australia.

**Rump Parliament** is the name by which the rag-end or remainder of the Long Parliament (1640-60) was known after the expulsion of the majority of its members on Dec. 6, 1648, by Cromwell's soldiers, commanded by Colonel Pride. Only sixty members, all extreme Independents, were admitted after this Pride's Purge, as it was called; and they, with the army, brought about the condemnation of Charles I. The *Rump* was forcibly dissolved by Cromwell in 1653, for opposing the demands of the army. Twice after this it was reinstated, but both times only for a brief period, and finally, on March 16, 1660, it decreed its own dissolution.

**Run'corn**, an English river port, in Cheshire, on the Mersey, 12 mi. above Liverpool, has shipbuilding yards and various factories. It lies near the terminus of the Bridgewater Canal, from the completion of which in 1773 the prosperity of the town may be dated. Pop. 1891, 20,050.

**Runes**, the letters of the alphabet peculiar to the ancient Teutonic peoples of Northwestern Europe, found inscribed on monuments, tombstones, clog calendars, bracteates, rings, weapons, etc., and only rarely and at a late period in MSS. They are formed almost invariably of straight lines, either single or in combination. Three runic alphabets (or "futhorks," as they are sometimes called from the first six letters) have hitherto been usually recognized: the Norse, with sixteen characters; the Anglo-Saxon, with forty; and the German; but modern researches have traced the common origin of these in an older primary Germanic or Teutonic futhork with twenty-four characters. The name is generally believed to be the same as A. Saxon *rûn*, a mystery, implying a magical or hieroglyphic character, which doubtless runic writings acquired when the lapse of

## Runjeet Singh

time had rendered them unintelligible to the common people; and runic wands or staves were smooth willow wands inscribed with runic characters, and used in incantations. The period of origin and the source of runes are not known. Scandinavian and A. Saxon tradition ascribes their invention to Woden. Runic inscriptions abound in Scandinavia, Denmark, Iceland, and the parts of England once known as Northumbria, Mercia, and East Anglia, but they are also found beyond these limits. Weapons and instruments, inscribed with runes, and dating from 300-400 A.D., have been dug up in Norway. The use of runes gradually disappeared under the influence of the early Christian missionaries, who proscribed them on account of their magical reputation; but in England some Christian inscriptions have been found in the runic characters. The latest runic inscriptions in Sweden date about 1450.

**Runjeet Singh** (1780-1839), the "Lion of the Punjab" and founder of the Sikh kingdom. His father, a Sikh chieftain, d. in 1792, and the government fell into the hands of his mother. At the age of seventeen, however, Runjeet rebelled against his mother's authority, assumed the reins himself, and began a career of ambition. The Shah of Afghanistan granted him possession of Lahore, which had been taken from the Sikhs, and Runjeet soon subdued the small Sikh states to the north of the Sutlej. The chiefs to the south of that river invoked the protection of the British, who made an arrangement with Runjeet in 1809, both accepting the Sutlej as the south boundary of his dominions. The ambitious prince now organized his army after the European model with the help of French and English officers, and steadily extended his power, assuming the title of rajah in 1812. In 1813 he took Attock, and in the same year assisted Shah Shuja, then a refugee from Afghanistan, in return for the famous Koh-i-noor diamond. In 1818 he captured Multan; in 1819 he annexed Cashmere, and in 1823 the Peshawur Valley. He was now ruler of the entire Punjab, and in 1819 had already assumed the title of Maharajah, or king of kings. In 1834 he suffered a heavy defeat from the Afghans, but he retained his power until his death.

**Run'nimede**, the meadow on the right bank of the Thames, now a race course, in Surrey, England, 4 mi. below Windsor, where King John met the barons who compelled him to sign Magna Charta, June 15, 1215. The actual signing is said to have taken place on Magna Charta Island opposite Runnimeade.

**Rupee**, the standard silver coin of British India, the sterling value of which, nominally about 50c., has, owing to the depreciation of silver, of late years varied between about 30c and 48c. A rupee equals 16 annas,  $\frac{1}{2}$ ,  $\frac{1}{4}$ , and  $\frac{1}{8}$  rupee are also coined in silver; 100,000 rupees are called a lac; 100 lacs, a crore.

**Rupert of Bavaria**, PRINCE (1619-1682), distinguished as a cavalry leader in the English civil war, the third son of Frederick V, elector palatine and king of Bohemia, by Elizabeth,

## Rusk

daughter of James I of England, was b. at Prague. After some military experience on the Continent he went to England to assist his uncle Charles I, and in 1642 was made general of the horse. He distinguished himself at Edgehill and Chalgrove, captured Birmingham and Lichfield in 1642, and Bristol in 1643, and displayed his courage at Marston Moor and Naseby in 1645, though his impetuosity and imprudence contributed to the disastrous results of these engagements. After the Restoration he was appointed lord high admiral, and served with Monk against the Dutch. He became governor of Windsor Castle, and d. in London. Many of his latter years were devoted to scientific study, and he is credited with the invention of mezzotint engraving, which at least he introduced into England. He was one of the founders and the first governor of the Hudson Bay Company.

**Rupertsland**, an extensive but indeterminate region in the interior of Canada, named in honor of Prince Rupert, and transferred to the Hudson Bay Company, of which that prince was one of the founders, by Charles II in 1670. This region is now included in Manitoba and the Western Territories, but its name still gives the title to the bishop of Rupertsland, who resides at Winnipeg.

**Rurik**, the founder of the Russian monarchy, who flourished in the ninth century, is generally considered to have been a Varangian or Scandinavian, and to have led a successful invasion against the Slavs of Novgorod about 862. He was assisted by his brothers, to whose territories he afterward succeeded. He d. in 879, and his family reigned in Russia till the death in 1598 of Feodor, son of Ivan the Terrible, when it was succeeded by the house of Romanoff. Many Russian families still claim a direct descent from Rurik.

**Rush**, BENJAMIN (1745-1813), famous American physician, was b. near Philadelphia. In 1766 he went to Edinburgh, and took his degree of M.D. there in 1768. He began to practise at Philadelphia in 1769, becoming at the same time lecturer in chemistry at the medical school of that city. He afterward filled the chair of the theory and practise of physic in the University of Pennsylvania. He early identified himself with the patriotic party, was one of the signers of the Declaration of Independence, and in 1787 was a member of the convention of Pennsylvania for the adoption of the Federal Constitution. In 1774 he was one of the founders of the first anti-slavery society in America. Dr. Rush was a voluminous and versatile writer. His chief medical works are his *Medical Inquiries and Observations*, *Diseases of the Mind*, and *Medical Tracts*.

**Rusk**, JEREMIAH M. (1830-1893), b. in Ohio. He took an active part in the Civil War and was made brigadier general in 1865. He was elected to Congress in 1871 from Wisconsin and served three consecutive terms. He was governor of Wisconsin from 1882 to 1889. In the latter year President Harrison appointed him secretary of agriculture.



## Ruskin

**Ruskin, JOHN** (1819-1900), art critic and political economist, and one of the most eloquent English prose writers of the century, was b. at London. He studied at Christ Church, Oxford; gained the Newdigate prize for his poem on *Salsette and Elephanta* in 1839, and graduated in 1842. His subsequent life had been the busy but uneventful life of a writer and teacher. Since 1885 Mr. Ruskin had lived in seclusion at his residence of Brantwood, on Coniston Lake. He was an LL. D. of Cambridge (1867), and a D.C.L. of Oxford (1871). In 1843 appeared the first volume of *Modern Painters*, by a *Graduate of Oxford*, in which Ruskin maintained the superiority of modern landscape painters, especially Turner, to the older masters, and at the same time advocated a complete revolution in the received conventions of art and art criticism. The subsequent volumes, of which the fifth and last appeared in 1860, expanded the subject into a most comprehensive treatise, while similar criticism was extended to another domain of art in his *Seven Lamps of Architecture* (1851), and his *Stones of Venice* (1851-53). In 1851 Ruskin appeared as a defender of pre-Raphaelitism, which had found inspiration in his works. As a political economist and social reformer he was an outspoken and uncompromising foe of what he considered the selfish and deadening doctrines of the so-called Manchester school, his chief works in this sphere being *Unto this Last* (1862), *Munera Pulveris* (1872), and *Fors Clavigera* (1871-84), a periodical series of letters to the working men and laborers of Great Britain. The Guild of St. George, a kind of cultured socialistic society, founded by him in 1871, with its headquarters at Sheffield, may also be taken to represent his views. Mr. Ruskin's other chief works, apart from pamphlets and contributions to periodicals, are: *Poems* (1850); *King of the Golden River* (1851), a fairy legend; *Sesame and Lilies* (1865); *Study of Architecture in our Schools* (1865); *Ethics of the Dust* (1866); *Crown of Wild Olive* (1866); *Queen of the Air* (1869); *Lectures on Art* (1870); "readings" from *Modern Painters*; *St. Mark's Rest* (1877); *Elements of English Prosody* (1880); *Arrows of the Chase* (1880), a collection of his letters by one of his pupils. Since 1885 Mr. Ruskin had been issuing a series of autobiographical papers under the title *Præterita*. Several of these works are illustrated by the author, and "first editions" with good impressions of the plates now command very high prices. Eloquence, force, and subtle analysis are the prevailing characteristics of Ruskin's literary style, while his works are at the same time permeated with a lofty enthusiasm for truth and beauty, and with a generous sympathy for the poor and the weak. Pl. 2, Vol. I.

**Russell, HOUSE OF**, an ancient English family, the head of which is the Duke of Bedford, has long been conspicuous in English political history for its devotion to Liberal or Whig principles. It claims descent from Tursin, one of the Norse invaders of Normandy, who took possession of Rozel Castle, near Caen. His descendants, Hugh de Rozel and

## Russell

his brother, accompanied William the Conqueror to England, where their name assumed its present form about 1200.

**Russell, JOHN (EARL RUSSELL)** (1792-1878), English Liberal statesman, the third son of the sixth duke of Bedford, was b. in London. Educated at a private school and at Edinburgh University, he entered Parliament in 1813 before attaining his majority. In 1819 he made his first motion in favor of parliamentary reform, the great question of which through life he was the champion. His influence in the Liberal party steadily increased, and though temporarily unseated in 1826, owing to his advocacy of Catholic Emancipation, he carried a motion in 1828 against the Test acts and thus led to their repeal. In 1831 he was paymaster-general in Lord Grey's administration, and though not in the cabinet introduced the first Reform bill to the House of Commons. In the exciting struggle that followed Lord John Russell was popularly accepted as the great champion of reform. In Lord Melbourne's second cabinet (1835-41) Russell was home secretary, and in 1839 he became colonial secretary. From 1841 till 1845 he led the opposition against Peel, with whom, however, he was in sympathy on the Corn Law question; and when Peel resigned in 1846 Russell formed a ministry and retained power, though with a small and uncertain majority, until February, 1852. He re-entered office in December, 1852, as foreign secretary under Lord Aberdeen, and in 1855 became colonial secretary in Lord Palmerston's cabinet. He represented Great Britain at the Vienna Conference, but incurred by his negotiations so much unpopularity that he resigned office in July of the same year. A period of rivalry between Lord John Russell and Palmerston now ensued, which, however, ended in 1859, when the former became foreign secretary under his old chief, by whom he was raised to the peerage in 1861. In 1865 Earl Russell succeeded Lord Palmerston in the leadership of the Liberal party, but when his new reform bill was rejected in 1866 the Liberals resigned. Thenceforward Earl Russell held no further office, though he warmly advocated all liberal measures. He was the author of numerous books and pamphlets, including lives of *Thomas Moore*, *Lord William Russell*, and *Charles Fox*, and *Recollections and Suggestions* (1813-73), published in 1875.

**Russell, JOHN SCOTT** (1808-1882), engineer and naval architect, was b. near Glasgow. After graduating at Glasgow at the age of sixteen he became a science lecturer, in Edinburgh, and in 1832-33 temporarily filled the chair of natural philosophy at Edinburgh University. Next year he began his important researches into the nature of waves, which led to his discovery of the wave of translation, on which he founded the wave line system of naval construction introduced into practise in 1835. He was manager of a large shipbuilding yard on the Clyde for several years, and in 1844 established a yard of his own on the Thames. He was one of the earliest advocates of ironclad

men-of-war, and was joint designer of the *Warrior*, the first English sea-going armored frigate; but the most important vessel he designed and constructed was the *Great Eastern*. One of his chief engineering works was the vast dome of the Vienna Exhibition of 1873, which had a clear span of 360 ft. He d. at Ventnor. He was the author of *The Modern System of Naval Architecture*, and other writings.

**Russell, WILLIAM CLARK** (1844- ), novelist, b. of English parents at New York, his father being Henry Russell, the popular singer and composer. He went to sea at an early age, but abandoned his nautical career in 1865 and took to literature. He has been connected with the newspaper press, but earned fame as the writer of sea stories. Among his numerous works may be mentioned *The Wreck of the Grosvenor*, *An Ocean Tree Lance* (1881), *A Sea Queen* (1883).

**Russell, WILLIAM E.** (1857-1896), governor of Massachusetts, b. in Cambridge, Mass. Thrice elected governor by the Democrats, he was an impartial executive; an advanced and liberal Democrat.

**Russia**, one of the most powerful empires of the world, second only in extent to the British Empire, and third as regards population. It comprehends most of Eastern Europe and all Northern Asia, and is bounded n. by the Arctic Ocean; w. by Sweden, the Gulf of Bothnia and the Baltic, Prussia, Austria, and Roumania; s. by the Black Sea, Turkey in Asia, Persia, Afghanistan, the Chinese Empire; e. by the Pacific and Bering's Strait. The total area in 1897 was officially estimated at 8,660,395 sq. mi.; pop. 128,932,173. For administrative purposes Russia is divided as follows:—

*European Russia*, including Sea of Azof, the Vistula Provinces (former Poland), and Finland; area 2,095,504 sq. mi.; pop. 106,154,607. Russia proper is subdivided into fifty provinces. There are also certain popular divisions of Russia, as Great Russia (in the center), Little Russia (in the southwest), White Russia (in the northwest). *Asiatic Russia* is divided into Northern Caucasia, Transcaucasia, Transcaspia, Kirghiz Steppes, Turkestan, Western Siberia, Eastern Siberia, Amur, and Maritime Provinces. St. Petersburg and Moscow are the two capitals of the empire.

*General Description*.—European Russia consists almost wholly of immense plains; the Valdai Hills, between St. Petersburg and Moscow, averaging 500 ft. and never exceeding 1,200 ft. above sea level, forming the only elevated region of the interior and an important watershed. The mountains of Taurida, lining the southern shores of the Crimea, have a height of about 4,000 ft.; the Caucasus, running from the Black Sea to the Caspian, reach the height of 18,500 ft.; the Urals, stretching from the Caspian to the Arctic Ocean and separating European from Asiatic Russia, have their greatest height below 7,000 ft. Russia is watered by numerous and important rivers, some of great magnitude and running a course of thousands of miles. The Petchora, the Mezen, Northern Dwina, and Onega are the

principal rivers of European Russia which send their waters to the Arctic Ocean; the Neva, Volkhoff, Soir, Narova, Velikaya, Duna, Niemen, and Vistula belong to the Baltic basin; the Black Sea basin comprises the Pruth, Dniester, Dnieper, and the Don; while the Caspian receives besides other rivers the Volga, the largest of all Russian rivers. Asiatic Russia has also a number of very large rivers, as the Obi, Yenisei, and Lena in Siberia, and the Amur towards the Chinese frontier. This complete river system is of incalculable value to Russia, as by its means internal communication is carried on. Canals connect the navigable rivers, so as to form continuous waterways. River steam navigation has been much developed of recent years. The lakes are also on a gigantic scale. Lake Ladoga, near St. Petersburg, is the largest in Europe. In Asia there is the Sea of Aral, larger than any of those mentioned, followed by Boikal, Balkash, and others. The Caspian Sea now also forms almost a Russian lake. From the extent of the plains and steppes, the swamps, moors, desert wastes, and forests of Russia, the scenery as a whole is very monotonous.

*Climate and Soil*.—As may be expected from its vastness this empire offers soils and climates of almost every variety. There is a polar, a cold, a temperate, and a warm region; in the first vegetation is all but extinct, in the latter the vine, the olive, and even the sugar cane grow to perfection. Extreme cold in winter and extreme heat in summer are, however, a general characteristic of Russian climates. As regards soil large sections of Russia are sandy, barren wastes, and vast morasses. The most productive portion is that between the Baltic and the Gulf of Finland, and the Volga, on the n. and e.; Prussia, Austria, etc., on the w.; and the Black Sea on the s. It has, generally speaking, a soft black mold of great depth, mostly on a sandy bottom, easily wrought, and very fertile. The more southerly portion of Siberia, as far east as the Lena, has, for the most part, a fertile soil, and produces, notwithstanding the severity of the climate, most kinds of grain.

*Vegetable Products, Agriculture*.—Boundless forests exist, especially in the Northern European provinces and the more temperate parts of Siberia, the area of the forest land in Europe being 42 per cent. of the total area. The fir, larch, alder, and birch predominate. In the south forests are less abundant, and the tracts around the Black Sea and the Caspian, and the immense steppes of the south and east, are almost wholly destitute of wood. Agriculture remains the chief pursuit of the bulk of the population. For some years it has, however, remained stationary, while manufacturing industries are steadily going ahead. The chief crops are rye, wheat, barley, oats, hemp, flax, and tobacco. Vine and beet culture is rapidly increasing, and the breeding of horses and cattle is also extensively carried on. Two fifths of the land of Russia proper are held by the state, mostly forest and waste, one fourth by landed proprietors, and about one third by peasants.

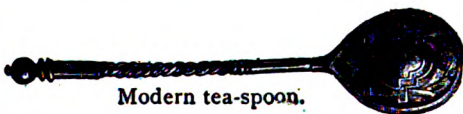




Peasant woman.



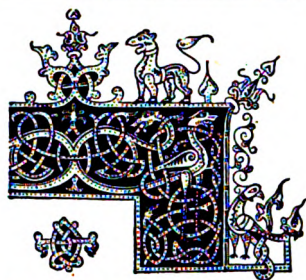
Peasant's house.



Modern tea-spoon.



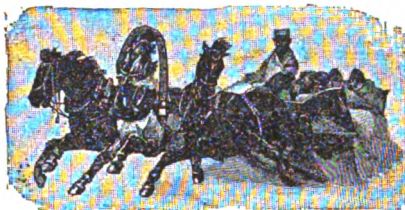
Modern bread-knife.



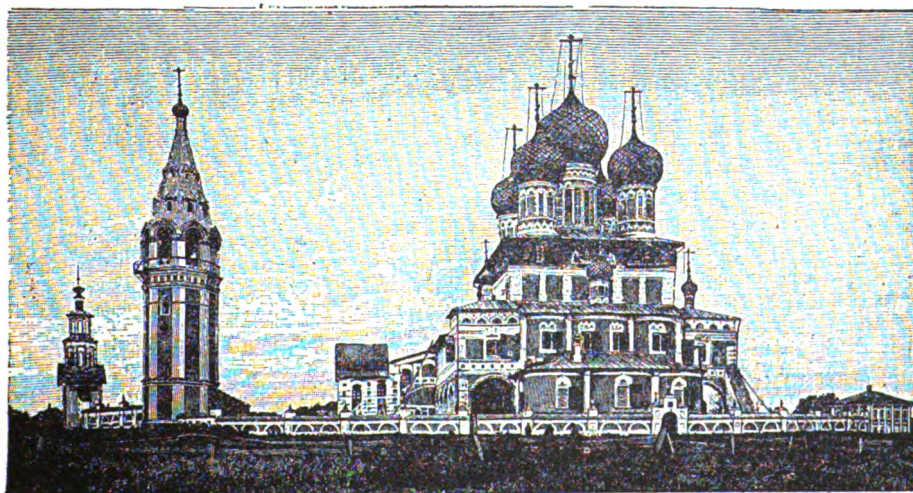
Design from testament (12th cent.).



Antique silver plate.

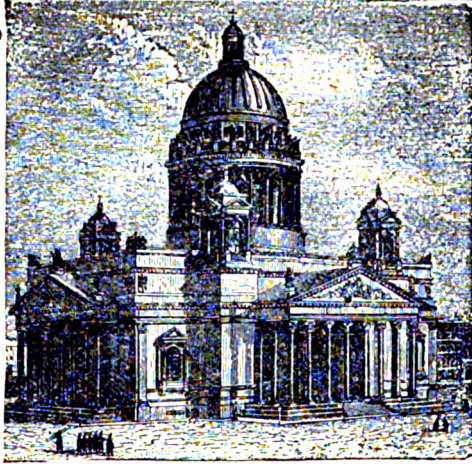


Troika.



Cathedral (1652).





Cathedral of Isaac (St. Petersburg).



Church of the Redeemer (Moscow).



Cathedral at Moscow (16th cent.).



## Russia

**Zoology.**—Among wild animals may be mentioned the bear, the wolf, wild hog, elk, and various animals which are hunted for their furs. Wild fowl abound, particularly near the mouths of rivers. Both on the coasts and in the rivers a great number of productive fisheries are carried on. In the Arctic Ocean vast numbers of seals are taken. The rivers of the Caspian, particularly the Ural and Volga, and the Sea of Azof, are celebrated for their sturgeon. In the same quarters are also important salmon fisheries. In the regions bordering on the Arctic Ocean large herds of reindeer are kept; and in the south, among the Tartars of the Crimea and the inhabitants of the Caucasus, the camel is often seen.

**Minerals.**—Russia is rich in minerals. Gold, platinum, silver, copper, iron, lead, manganese, coal, salt, and saltpeter all exist in abundance, and there are copious petroleum springs in the Caspian region. The precious metals are chiefly obtained in the Ural and Altai regions; the production in 1902 was as follows: gold, \$22,533,400; silver, \$205,200. In the Ural, iron beds are also rich and numerous, exceeding all others in productiveness. Copper is most abundant in the government of Perm; lead in the Ural and some parts of Poland; saltpeter in Astrakhan. Of the coal mines those of the Don basin are the principal at present, those of Kielce ranking second; the mines around Moscow come next. About 60,000 tons of manganese ore are annually extracted in the Ural and the Caucasus. The petroleum wells of Baku on the Caspian now send their products all over Europe.

**Manufactures.**—Prior to the accession of Peter the Great, Russia had no manufactories; he started them, and under the more or less fostering care of his successors they have steadily grown. Especially since 1865 a number of important industries have developed, this being mainly due to Russia's protective policy. The latest statistics give about 1,000,000 persons as being employed in the various manufacturing industries. Two fifths of the entire production come from the governments of St. Petersburg and Moscow. Arranged according to the money value the various manufactures rank as follows: spirits, sugar, cottons, and yarns, flour, tobacco, foundry products, flax, yarn and linen, leather, woolen cloth, and yarn, iron, machinery, beer, soap, timber, paper, oil, glass, chemicals, agricultural implements.

**Trade.**—The bulk of Russia's external trade is carried on through the European frontier, and the Baltic and Black Sea ports. The chief exports are; grain (about one half of entire exports), flax, linseed, and other oleaginous seeds, timber, hemp, wool, butter and eggs, spirits, bristles, and furs, in the order indicated. The chief imports are cotton, wool, tea, machinery, coal and coke, cotton yarn, metal goods, wine, olive oil, raw silk, herrings, textile goods, fruit, coffee, tobacco. The import trade is heaviest with Germany, Great Britain, China, U. S., in the order named. In the export trade Great Britain takes the lead, Germany, the

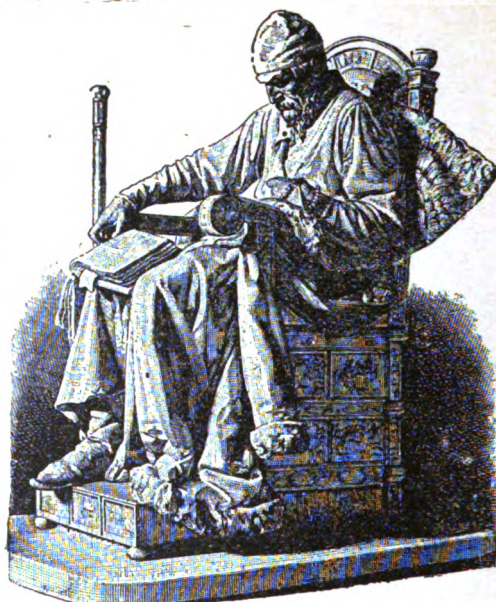
## Russia

Netherlands, France, Austria, Hungary following. The imports in 1901 amounted to \$322,583,062, the exports to \$368,955,242 (the import and export of bullion not included). The development of the vast natural resources and trade of Russia is prevented by transport difficulties. The magnificent river and canal system is not available for a good part of the year, and railways are comparatively limited. In the year 1902 there were 29,875 mi. of railways in operation in the Russian empire, being less than in the United Kingdom. The Trans-Siberian railway, now being constructed, will add 4,950 mi. of railway to the empire. An important line recently constructed is the Transcaspian railway, from Michailovsk, on the southern shore of the Caspian, to Samarcand via Bokhara. The latter is pre-eminently a military line, but it will also largely stimulate trade in the heart of Asia. In 1901, there were 100,000 mi. of state telegraph. Trade is further assisted by immense fairs, which are much frequented by European and Asiatic merchants. The principal is that of Nijni-Novgorod, with a turnover of \$150,000,000. The leading ports are Archangel and Onega on the White Sea; Abo, Helsingfors, and Viborg in Finland; Cronstadt, St. Petersburg, and Reval on the Gulf of Finland; Riga on the Gulf of Riga; Libau on the Baltic; Odessa and Nicolaieff on the Black Sea; Kertch in the Crimea; Taganrog on the Sea of Azof; and Astrakhan, Baku, and Kizliar on the Caspian. Other ports are being fostered by government in the south. The silver ruble, containing 278 grains of fine silver, is the money unit, value about 58 cents. It is divided into 100 kopecks. In actual circulation there is little else than paper money.

**Government, etc.**—Russia is an absolute hereditary monarchy, the emperor (czar or tzar), being the supreme ruler and legislator, and the final tribunal in all matters political or ecclesiastical. The present emperor's income is about \$12,000,000. His title is Emperor and Autocrat of all the Russias, Czar of Poland, and Grand-prince of Finland. The administration is divided into ten departments, formerly eleven, with a minister at the head of each nominated by the emperor. Holding a distinct position from these are four great boards or councils. The first is the state council, a permanent body composed of an unlimited number of high officers appointed by the emperor, and presided over by a member of the imperial family; it institutes and elaborates all laws for the decision of the emperor. These laws are initiated by the respective ministers acting directly under the emperor. The second council is the council of ministers, presided over by the minister of justice. The third is the senate of the empire, a superior court of appeal. The Holy Synod is the fourth council, a body of high church dignitaries. There are in addition a special imperial cabinet and two private cabinets, to which the rest of the councils are subject. Finland has nominally preserved its ancient constitution with a national parlia-



1. Equestrian Statue of Peter the Great at St. Petersburg.



2. Iwan IV. the Terrible—Hermitage at St. Petersburg by Antokolski (1871).



3. Monument of Minin-Posharskij at Moskau, by Matros (1818).



4. Statue of Donian Cossacks, by Lanceray.



5. Equestrian Statue of Nicholas I. at St. Petersburg, by Clodt (1859).



## Russia

ment of four estates, but it is really ruled by a governor general and senate appointed by the emperor. Some of the Baltic provinces also possessed certain privileges, but these are being gradually curtailed. Each government of the empire is under a governor and vice governor; there are also a few general governors, who have more than one government under them. The communes into which the provinces and districts are divided possess a certain amount of local government, and elect their own local dignitaries, but these are again subject to an all-powerful police. Russia is heavily in debt, chiefly abroad, Germany in particular holding large amounts of Russian stocks. Total liabilities of the empire, 1902, \$3,167,320,000. The total revenue in 1901 was about \$891,772,000; total expenditure, \$921,068,000. The bulk of the revenue is obtained by indirect taxation, spirits furnishing about one third of it; other items are personal and land taxes, trade licenses, tobacco and sugar, customs.

*Army and Navy.*—Russia possesses one of the most powerful armies in the world. On a peace footing it is placed at 1,000,000 men, the war strength at 3,550,000. Besides these it is calculated that in an emergency the territorial reserve could supply 2,000,000 more men, the national militia 1,200,000, making a total of nearly 7,000,000 men. Liability to military service is universal from the age of 20 to that of 43; and five years must be passed in active service. The navy comprises 43 vessels of the first rate, 48 second, 88 third, and 20 fourth—192 vessels in all; manned by 30,500 seamen and marines.

*Religion and Education.*—The established religion of Russia is the Eastern or Greek Church, and one of the fundamental laws of the state is that the emperor must belong to that church, and none of the imperial family may marry a wife belonging to another religion without the express sanction of the emperor. Most religions are tolerated, but Roman Catholics, and especially Jews, are frequently subject to interference and even persecution. Education in spite of many obstacles is progressing, but Russia (Finland excepted, which has all but universal education) is still nearly a century behind other European nations, perhaps Spain and Portugal excepted. The empire is divided into 15 educational districts, each under the direction of a commissioner. Less than half the children of school age receive instruction. In 1902 the total number of university students was 17,299.

*People.*—The population of Russia is increasing faster than that of any other European nation, Great Britain, perhaps excepted. As regards language (and so far also race) the peoples of Russia are comprised under two great divisions of Aryans and Mongolians; the former include Slavonians, Germans, and Greeks, the latter the Finnish and Tartar races. A gradual absorption by the Slavonic races is going on. The political divisions of the Russian people comprise numerous grades of nobility, which are partly hereditary and

## Russia

partly acquired by military and civil service, especially the former, military rank being most highly prized in Russia. The clergy, both regular and secular, form a separate privileged order. Previous to the year 1861 the mass of the people were serfs subject to the proprietors of the soil. The emperors Alexander I and Nicholas took some initial steps toward the emancipation of this class; but a bold and complete scheme of emancipation was begun and carried out by Alexander II in 1861.

*Language.*—A number of languages and a vast variety of dialects are naturally spoken in a country comprising such a heterogeneous population, but the Russian is the vernacular of at least four fifths of the inhabitants, the literary and official language being specifically the "Great Russian," or that belonging to Central Russia surrounding Moscow. It is one of the Slavonic family of the Aryan or Indo-European languages, and as such is a sister of Greek, Latin, Sanskrit, German, English, etc. Modern Russian has been much modified by the introduction of Greek, Tartar, and Mongolian terms. It has an alphabet of thirty-seven letters, a written and printed character of a peculiar form, and a pronunciation which it is hardly possible for any but natives to master.

*Literature.*—The introduction of Christianity in 998 first created a taste for letters among the ancient Slavonians, but the chief remains of that early literature are some fragments of traditional tales in rhythmic verse, which have recently excited much attention on account of their similarity to the English, Spanish, and Scandinavian ballads. Among the earliest works reduced to writing is a book of the Gospels dating from 1056 or 1057. The Tartar invasion arrested the progress of literature, and Russia fell back into barbarism, whence she only emerged again after the accession of the house of Romanoff. The revival of literature was at first confined to some crude and feeble dramatic performances, and toward the close of the seventeenth and the beginning of the eighteenth centuries, to poor imitations of French, German, and other foreign works. Lomonosof (1711-65) wrote a number of works both in prose and verse, and by his precepts and example did much to originate a national literature, and to fix the grammar of the language. His contemporary Sumarokoff carried the drama to a high degree of perfection; Derzhawin (1743-1816) distinguished himself highly in lyrical and other poetry; and since then many writers have distinguished themselves in all departments. Of the more modern authors particular mention is due to Alexander Pushkin, Russia's greatest poet, and Michael Lermontoff, not far his inferior. The most eminent novelists are Nicholas Gogol, Ivan Turgeneff, Feodor Michailovitch, Dostoieffsky, Alexander Herzen, and Count Leo Tolstoi, the last the greatest of the living fiction writers of Russia. Russia possesses a number of valuable libraries. The first Russian press was set up at Moscow in 1554.

**History.**—The origin of the Russian empire is involved in much obscurity, but it is usually regarded as having been founded by Rurik, a Scandinavian (Varangian), about 862, his dominions and those of his immediate successors comprising Novgorod, Kieff, and the surrounding country. Vladimir the Great (980-1015), the Charlemagne of Russia, introduced Christianity, and founded several cities and schools. But from this period down to 1237, when the country was overrun by the Tartars, Russia was almost constantly the scene of civil war. For more than two centuries Russia continued subject to the Tartars, while on its opposite frontier it was exposed to the attack of the Poles and Teutonic Knights. In 1328 the seat of government was transferred from Novgorod to Moscow; and in 1481 the Tartars were finally expelled under Ivan the Great (1462-1505). Ivan extended the Russian dominions, married the niece of the last Byzantine emperor, and ever since the rulers of Russia have looked with longing eyes upon the territories of which the Byzantine empire consisted. Ivan the Terrible (1533-84) did much to extend and consolidate the Russian territory, and in particular began the conquest of Siberia, which was completed in 1699. In 1613 the house of Romanoff, whence the present czar is descended, was raised to the throne, and from this period the empire gained greater strength and consistency. Under Alexis Michailovitch (1645-76) White Russia and Little Russia were conquered from the Poles, and the Cossacks of the Ukraine acknowledged the supremacy of the czar; various internal improvements were effected, and the power of Russia began to be felt and feared by all her neighbors. But Russia's real greatness may be said to date from the accession of Peter the Great in 1696, who first secured the country the attention of the more civilized nations of Europe. His first military achievement was his conquest of Azoff from the Turks in 1699, which, however, he lost again in 1711. He also completed the conquest of Siberia; and, what was of more importance, obtained from Sweden by the peace of Nystadt in 1721 Livonia, Esthonia, Ingria, or part of Karelia, the territory of Viborg, Oesel, and all the other islands in the Baltic from Courland to Viborg. Catharine I, widow of Peter I, succeeded on the death of the latter, but died after a reign of only two years.

The three partitions of Poland took place under Catharine II in 1772, 1793, and 1795. Russia acquired nearly two thirds of this once powerful state. By the Peace of Kutchuk-Kainarji in 1774, the Turks gave up Azoff, part of the Crimea (the other part was taken possession of in 1783), and Kabardah; and by the Peace of Jassy in 1792, Oczakov. Georgia also came under the protection of Russia in 1783, and Courland was incorporated in 1795. A portion of Persian territory had already been acquired; and in 1801 the formal annexation of Georgia was effected. The Peace of Frederickshaven, 1809, robbed Sweden of the whole of Finland, which now passed to Russia; the Peace of Bukarest, 1812, took Bessarabia

from the Turks; that of Tiflis, 1813, deprived the Persians of parts of the Caucasus; and then the Vienna Congress of 1815 gave the remainder of Poland to Russia. After fresh wars the Persians lost the provinces of Erivan and Nakhichevan in 1828; and the Turks lost Anapa, Poti, Akhalzik, etc., by the Peace of Adrianople in 1829. The desire to possess further dominions of the sultan led to a war against Turkey in 1853, in which England, France, and Sardinia also took part in 1854, and which ended in the Peace of Paris, 1856. The Russians were compelled to restore to Moldavia the left bank of the Danube in Bessarabia. This district, however, was again restored to Russia by the Congress of Berlin in 1878, which followed the Russo-Turkish war of 1877-78. In 1858 Russia acquired by agreement with China the sparsely populated but widely extended district of the Amur; the subjection of Caucasia was accomplished in 1859 and 1864, and considerable conquests have followed since 1866 both in Turkestan and the rest of Central Asia. A ukase of 1868 annihilated the last remains of the independence of Poland by incorporating it completely in the czardom. On the other hand, Russian America was sold to the U. S. in 1867. The population from 14 millions in 1722 has grown to 118,364,649. Of late years a great disturbing element to the government of Russia has sprung up in Nihilism. Alexander II was killed by its agency. Nov. 1, 1894, Alexander III died, and was succeeded by his eldest son Emperor Nicholas II, the present czar, who shortly afterwards married Princess Alix of Hesse. A gigantic Russian enterprise is the Trans-Siberian railway. It was begun in 1892. The terminus of the road is Port Arthur, in Manchuria. At the close of the China-Japan war in 1895 Russia secured a lease of the peninsula of Kwang-tung, in China, including the ports of Port Arthur and Dalny but the treaty at the close of the war with Japan affected the provisions of this lease (See *Treaty*, below). The results of the autocratic rule in Russia have been revolution and almost a reign of terror. The general discontent among the poorer classes has been steadily growing and, since their demands for civil liberties were repeatedly refused, they resorted to violent measures. In Oct. 1905, the czar was forced to issue a manifesto declaring liberty of press, speech and religion. Besides this the people were given the Duma, a real legislative body and Count Witte was made minister-president. Thus a step towards constitutional government in Russia has been made and the last absolute monarchy among foremost nations has disappeared.

**Russo-Japanese War.**—The immediate cause of the war was the alleged encroachments by the Russians on territory which they had agreed to evacuate according to a treaty with China. The action of Russia in maintaining her occupation of Manchuria and thus endangering the safety of Japan led Japan to take the offensive. War was declared Feb. 10, 1904, and the treaty of peace was not concluded until Sept. 5, 1905.

## Russia

(For account of the war see *Japan*). On the invitation of President Roosevelt the two countries sent their representatives, who met at Portsmouth, N. H. The peace commission consisted of Baron Komura and Mr. Takahira representing Japan, and Baron Rosen and Count Sergius Witte representing Russia. The principal terms of the treaty include the following articles: Japan possesses supreme political, military and economical interests in Korea and Russia shall not interfere with those interests; Japan and Russia mutually engage to evacuate Manchuria except territory affected by the lease of the Liaotung peninsula and to restore to China all the portions of Manchuria except the territory above mentioned; the Russian government transfers and assigns to Japan with the consent of China, the lease of Port Arthur, Talien and adjacent territory and waters with attendant rights and privileges and the railway between Changchunfu, Kuan-changtsu and Port Arthur; Japan and Russia shall use their railways in Manchuria exclusively for commercial and industrial purposes and not for strategic purposes; Russia cedes to Japan in perpetuity and full sovereignty the southern portion of the island of Sakhalin, the northern boundary of which is the 50th degree of north latitude, along with all the adjacent islands, and both countries agree not to construct on their respective possessions any fortifications or other similar military works; Russia engages to arrange with Japan concerning the rights of fishing along the coasts.

**Rust**, a disease which attacks cereals and many pasture grasses, known also by the names of red gum, red rag, red robin. It is most common on the leaves, on which it is visible in the form of orange-colored, mealy spots, but is by no means confined to them. It is produced by a species of fungus, the growth of which seems to be specially favored in ill ventilated fields under excessive summer heat.

**Rustchuk**, a town of Bulgaria, situated on the right bank of the Danube, where that river is joined by the Lom. Its position makes it a place of considerable strategic importance. It was nearly destroyed by the Russian bombardment during the Russo-Turkish War of 1877-78, and the fortifications have been dismantled by order of the Berlin Congress. Pop. 27,198.

**Ruth**, **BOOK OF**, a canonical book of the Old Testament. It is a kind of appendix to the Book of Judges, and an introduction to those of Samuel, and is therefore properly placed between them. The story of Ruth records in simple language the ancient rights of kindred, redemption, and other interesting customs of Hebrew antiquity. The date of the history and the name of its writer are unknown, but it is probably of a date subsequent to the captivity.

**Rutile**, red oxide of titanium, a brown, red, yellow, and sometimes nearly velvet-black ore. It is found in many European countries, in North America, and the Urals, chiefly in the veins of primitive rocks. It is infusible before the blowpipe without a flux.

## Rye-house Plot

**Rutland**, Rutland co., Vt., 60 mi. s. of Burlington. Railroads: Central Vermont and others. It is the shipping center of the Vermont white marble quarries. Other industries include scale works, marble monument works, and shirt, button, and iron goods factories. Pop. 1900, 11,499.

**Ruysdaal** (rois'däl) (or Ruysdael, Jacob van) (1625-1682), one of the most distinguished Dutch landscape painters, b. at Haarlem. Fine examples of his works are to be seen in the National Gallery at London, and in the Louvre at Paris. Landscapes with dark clouds hanging over them, lakes and rivulets surrounded by overhanging trees, etc., are his subjects, and are represented with true poetic feeling and admirable technique.

**Ruyter** (roi'ter), MICHEL ADRIAANSZON DE (1607-1676), a celebrated Dutch admiral, b. at Flushing. He rose to his rank from the situation of cabin boy, and distinguished himself for remarkable seamanship and bravery in many naval battles, but more especially in 1653, in 1666, and in 1672, against the British fleet.

**Ryan**, PATRICK JOHN (1831- ), R. C. archbishop, was b. near Thurles, Ireland. He was ordained deacon in 1853, completing his studies in St. Louis, Mo., and raised to the priesthood in 1854. In 1872 was elected coadjutor archbishop of St. Louis. His administration was energetic and successful. He was nominated archbishop of Philadelphia in 1884. He is distinguished as a graceful and eloquent speaker.

**Rye**, a species of grain of which there are several varieties. It is an esculent grain bearing naked seeds on a flat ear, furnished with awns like barley. It is a native of the Levant, but has been cultivated in Europe from time immemorial. It thrives in climates and in soils which forbid wheat; requires less manure, and ripens faster. It is extensively grown in Northern Europe, and rye bread forms the chief subsistence of the laboring classes of many parts of Russia, Sweden, Norway, Denmark, Holland, and Prussia. Unmalted rye meal mixed with barley malt and fermented forms the wash whence is distilled the spirit known as Holland gin. The straw is long, flexible, does not rot easily, and is used by brickmakers and thatchers, also for stuffing horse collars, mattresses, etc., and for making baskets, straw hats, and bonnets. Rye is subject to a disease called ergot, which renders it dangerous for food. See plate, *Grains - Wheat*.

**Rye Grass**, the common name of a number of grasses.

**Rye-house Plot**, in English history, a conspiracy, planned in 1683, the immediate object of which was to assassinate Charles II and his brother, the Duke of York (afterward James II), as they returned from the Newmarket races. This plan was to have been executed on the road to London, near a farm called Rye-house, belonging to one of the conspirators named Rumbold; but it was frustrated by the king and his brother happening to return from Newmarket earlier than was expected.



### **Rye-house Plot**

The detection of the plot led to the arrest on a charge of high treason of Lords William Russell, Essex, and Algernon Sidney, who were in no way connected with it. Essex put an end to his own life in the Tower, while Russell and Sidney were beheaded, as also Lieutenant Colonel Walcot, one of the real contrivers of the plot.

### **Ryswick**

**Ryswick** (properly *Rijswijk*) (ris'wik, ris'-wik), a village and castle situated in South Holland, not far from The Hague, where the Peace of Ryswick, which terminated the war waged against Louis XIV by a league consisting of Holland, the German Empire, Britain, and Spain, was signed (Sept. 20 and Oct. 30, 1697).

# S

## Saale

**S**, the nineteenth letter of the English alphabet, representing the hissing sound produced by emitting the breath between the roof of the mouth and the tip of the tongue placed just above the upper teeth. From this circumstance it has sometimes been reckoned among the linguals (as the tongue is essential in its pronunciation), sometimes among the dentals (as the teeth co-operate in producing the hissing sound). More descriptively it is classed as a *sibilant*. It has a twofold pronunciation—sharp or hard, as in *sack, sin, this, thus*; and soft or sonant (when it is equivalent to *z*), as in *muse, wise*.

**Saale** (zä'lè), the name of several German rivers, the most important of which is that which rises on the north side of the Fichtelgebirge, in the northeast of Bavaria, and joins the Elbe after a course of above 200 mi. It passes the towns of Hof, Jena, Naumburg, Merseburg, Halle, etc., and is of great commercial importance.

**Saba**, a small West Indian island, belonging to Holland, and governed as a dependency of Curaçoa. It consists of a single volcano cone, furrowed by deep, wooded, and fertile valleys, producing sugar, cotton, and indigo. Area 5 sq. mi.; pop. 2,505.

**Sabadil'la** (Cebadilla or Cevadilla), the name given in commerce to the pulverized seeds of the sabadilla plant. Mexico now supplies the bulk of the sabadilla seeds employed in pharmacy. The seeds of both plants are long, triangular, blackish brown outside, white inside, of an acrid and burning taste, but without smell. Sabadilla powder is used as a vermifuge. The alkaloid extracted from the seeds, and known as *veratrine*, is applied externally in cases of neuralgia, rheumatism, gout, dropsy, and also as an insecticide. Large doses of veratrine act as a most irritant and energetic poison, while small doses prove a rapid cathartic and diuretic.

**Sabbath** (a Hebrew word signifying rest) is the day appointed by the Mosaic law for a total cessation from labor, and for the service of God, in memory of the circumstance that God, having created the world in six days, rested on the seventh. Sabbath is not strictly synonymous with Sunday. Sunday is the mere name of the day; Sabbath is the name of the institution. Sunday is the Sabbath of Christians; Saturday is the Sabbath of the Jews and some minor Christian sects. On the Sabbath the Jews were not allowed to go out of the city farther than 2,000 cubits, that is, about a mile, and this distance was called a *Sabbath-day's journey*. And as every seventh day was a day of rest to the people, so was every seventh year to the land. It was unlawful in this year to plow or sow, or prune vines; and if the earth brought forth anything

## Sable

of its own accord, these spontaneous fruits did not belong to the master of the ground, but were common to all. This year was called the *Sabbatical year*, and was also to be a year of release for Jewish debtors. The desire of distinguishing the Christian from the Jewish observance early gave rise to the celebration of Sunday, the first day of the week, instead of the Sabbath. In 366 the Council of Laodicea removed all scruples as to the duty of Christians to keep the Jewish Sabbath.

**Sabicu'** (or Savicu'), a leguminous tree, native of Cuba. It furnishes an exceedingly heavy and hard wood, with a texture as smooth, close, and firm as ivory almost, and of a rich, warm, red color. It is much employed for shipbuilding and cabinetmaking.

**Sab'ine**, river of the U. S. It rises in the northeastern part of Texas, and after a course of some 500 mi. flows into the Gulf of Mexico through Sabine Bay. It is too shallow to be of much use for navigation.

**Sab'ine**, SIR EDWARD (1788–1883), a British astronomer and physicist, b. at Dublin. Although he gained the rank of major general in 1859, it is not to his military achievements that he owes celebrity, but to his earnest and long continued researches in astronomy and physical geography. As astronomer he accompanied Sir J. Ross, and afterward Sir E. Parry, in search of the Northwest Passage, made valuable observations, and collected numerous data regarding the length of the pendulum and the variations of the magnetic needle. He made other voyages to tropical and arctic regions to investigate these and allied subjects, and published his researches in the *Philosophical Transactions*, and the *Transactions of the British Association and the Royal Society*.

**Sab'ines** (*Sabini*), an ancient people widely spread in Middle Italy, allied to the Latins, and already an important nation prior to the foundation of Rome. Originally they were confined to the mountain districts to the northeast of Rome, and their ancient capital was Amiternum, near the modern Aquila. As an independent nation they ceased to exist in 290 B.C., when they were incorporated with the Roman state.

**Sable**, a carnivorous mammal nearly allied to the common marten and the pine marten, found chiefly in Siberia and Kamtchatka, and hunted for its fur. Its length, exclusive of the tail, is about 18 in. Its fur, which is extremely lustrous, and hence of the very highest value, is generally brown, grayish yellow on the throat, and with small grayish-yellow spots scattered on the sides of the neck. It is densest during winter, and owing to the mode of attachment of the hairs to the skin it may be pressed or smoothed in any direction. The Tartar sable is the name given to a species of

## Sable Island

the weasel genus found in Northern Russia and Siberia, and the pekan of North America is sometimes known as the Hudson's Bay sable. The skins of all these varieties are frequently dyed and otherwise manipulated to imitate the true Russian sable. Sable hair is also used



Sable.

in the manufacture of artists' pencils. Sable fur has been of great value from very early times.

**Sable Island**, a low, treeless, sandy island in the North Atlantic, off the east coast of Nova Scotia, 25 mi. long and 1 to 5 broad. It has a refuge for shipwrecked persons and two lighthouses. Many shipwrecks have occurred on it.

**Sacch'arin**, an artificial sugar prepared from coal tar, first introduced to commerce in 1887 by its discoverer, Dr. Constantin Fahlberg of Salbke (Germany). Its sweetening properties are enormous; one grain of saccharin is said to sweeten distinctly 70,000 grains of distilled water. It is not a fermentable sugar, and is already in common use in the treatment of disease, as diabetes, for instance; and in many cases in which the palate craves for sweets, but in which ordinary sugar cannot, without danger, be permitted. Although not a food, there is no doubt that saccharin will to a certain extent compete with natural sugars, especially in confectionery and preserving. The French Conseil d'Hygiène et de Salubrité appointed a commission to inquire into the properties of saccharin, and their report, issued in 1888, states that its use in food would seriously affect the digestive functions, and recommends the government to prohibit its employment in alimentary substances. The discoverer and many eminent chemists, Continental and British, deny that saccharin is injurious to the human system, and it is also asserted that the hostility to the new sweetening substance emanates from those interested in the French sugar industry. It is largely in use in Germany in the manufacture of confectionery, brewing, etc.

**Saccharom'eter** (or Saccharimeter), an instrument for determining the quantity of saccharine matter in any solution. One form is simply a hydrometer, for taking the specific gravity of the solution; another is a kind of polariscope, so arranged that the solution may

## Sacramento

be interposed between the polarizer and analyzer, and by observing the angle through which the plane of polarization is turned in passing through the solution, the datum is given for the calculation of the strength.

**Sachs** (zaks), HANS (1494-1576), the most distinguished meistersinger of Germany in the sixteenth century, b. at Nuremberg. He learned the trade of a shoemaker, and after the usual *wanderjahre*, or period of traveling from place to place, commenced business in his native city. An enthusiastic admirer of the minnesingers, he took lessons under one of the chief meistersingers of Nuremberg, and to while away the tedium of the cobbler's art made verses himself. In this he soon surpassed all his contemporaries, producing 6,000 poems one fourth of which are in print. As a staunch follower of Luther, and an ardent advocate of his teachings, Sachs succeeded in imparting to his hymns a flavor which considerably aided the spread of the Reformation. A bronze statue to his memory was erected in 1874 at Nuremberg, where his house may still be seen.

**Sackville**, THOMAS (1536-1608), Lord Buckhurst and earl of Dorset, an English statesman and poet, son of Sir Richard Sackville of Buckhurst. At Oxford and Cambridge he distinguished himself by his Latin and English poetry, and as a student of the Inner Temple he wrote, in conjunction with Thomas Norton, the tragedy of *Gorboduc*, or *Ferrex and Porrex* (published in 1561), remarkable as the first example in English of regular tragedy in blank verse. He took a prominent and creditable part in some of the chief events of Elizabeth's reign. He was a member of the court which tried Mary Queen of Scots; he succeeded Lord Burleigh as lord high treasurer; and presided at the trial of the Earl of Essex. He was buried at Westminster Abbey.

**Saco**, a river in the U. S. It rises in New Hampshire, in the White Mountains, and runs southeast into the Atlantic below Saco, in Maine. It is 160 mi. long, and has falls of 72 ft. at Hiram, of 42 ft. at Saco, and numerous minor ones.

**Saco**, York co., Me., on the river of the same name, which supplies water power to several factories, including woolen, cotton, and saw mills. Pop. 1900, 6,122.

**Sacramen'to**, a river in California. It rises in the Sierra Nevada, on the borders of Oregon, and drains the central valley of California from the north. Its course is about 500 mi., 300 of which are navigable for small steamers. It discharges its waters into the Bay of San Francisco.

**Sacramento**, Sacramento co., Cal., the state capital, and at head of navigation on Sacramento River, 83 mi. n.e. of San Francisco. Railroad, Southern Pacific. Seat of state library, Crocker Art Gallery, and has a magnificent statehouse. Supplies a large mining district and agricultural valley, and is a point of shipment for nuts, hops, dried fruits, etc. Leading industries include railroad car and machine shops, employing 2,000 hands, smelting and refining works, potteries, lumber,



## Sacrifices

woolen goods, flour, and carriage factories. Pop. 1900, 29,282.

**Sacrifices**, gifts offered with some symbolic intent to the Deity, generally an immolated victim or an offering of any other kind laid on an altar or otherwise presented in the way of religious thanksgiving, atonement, or conciliation. The origin of sacrifice is a point much disputed; the two opposed views being that of a primeval appointment by the Deity, and that of a spontaneous origination in the instinctive desire of man to draw near to God. The symbolic character of sacrifice may be represented under three heads: 1, Propitiatory, or designed to conciliate generally the favor of the Deity; 2, Eucharistic, or symbolical of gratitude for favors received; 3, Expiatory, or offered in atonement for particular offenses. To a different class may be assigned deprecatory sacrifices designed to avert the wrath or appease the wicked disposition of deities. The customs of the Jews regarding sacrifice are noteworthy on account of their very express and explicit claims to a divine origin, and because of their connection with the Christian religion. Details are amply given in the book of Leviticus. Few religions, whether ancient or modern, have omitted sacrifices from among their rites. The ancestors of all the existing races in Europe practised human sacrifices, and similar usages widely prevailed throughout the world. Among Christians the Roman Catholic and Greek churches regard the mass as a mysterious sacrifice; but with Protestants it is not generally so regarded.

**Sacy** (sâ-sê), ANTOINE ISAAC, BARON SILVESTRE DE (1758-1838), French philologist, b. in Paris. After acquiring a thorough knowledge of the Greek and Latin classics, he studied Hebrew, Syriac, Chaldee, Samaritan, Arabic, and Ethiopic; mastered the principal European languages, including Turkish, and later on also Persian; was appointed professor of Arabic in the School of Oriental Languages in 1795, and in 1806 professor of Persian at the College of France. In 1808 he was elected to the Corps Législatif. He was one of the most active members of the Asiatic Society and of the Academy of Inscriptions, and a prolific contributor to the learned *Transactions* of the period. His teaching gave a powerful impetus to the study of Oriental languages in Europe.

**Saddle**, a kind of seat for a horse's back, contrived for the safety and comfort of the rider. In early ages the rider sat on the bare back of his horse, but in course of time some kind of covering was placed over the back of the animal. Such coverings became afterward more costly, and were sometimes richly decorated. The modern riding saddle consists of the tree, generally of beech, the seat, the skirts, and the flaps, of tanned pig's skin, and the construction and weight vary according to the purposes for which it is to be used. Among the varieties are racing saddles, military saddles, hunting saddles, and side-saddles for ladies. The name saddle is also given to a part of the harness of an animal yoked to a vehicle,

## Safe

being generally a padded structure by means of which the shafts are directly or indirectly supported.

**Sad'ducees**, one of the two chief sects or parties existing among the Jews in the time of Christ. Various accounts are given of their origin. Some critics recognize in the Sad'ducees the descendants and adherents of the Zadok. They were a less numerous, but more aristocratic party than the Pharisees; they possessed the largest share of wealth, and, in consequence, generally held the highest dignities. A constant feud existed between the two sects. The Sadducees were distinguished for three special beliefs or doctrines; they repudiated the oral law, they denied the resurrection of the dead, and disbelieved in the existence of angels and spirits (or at least did not hold the current views regarding these). The Sadducees rapidly disappeared after the first century of the Christian era.

**Sadi** (or Saadi) (1200-1291), the most celebrated didactic poet of Persia, b. at Shiraz. In his youth he visited Hindustan, Syria, Palestine, Abyssinia, and made several pilgrimages to Mecca and Medina. While in Syria he was taken by the Crusaders, and actually compelled to labor as a slave at the fortifications of Tripoli. After about fifty years of wandering he returned to his native city, delighting everybody with his poems and sage precepts. The best of his works are: *Gulistan* (Garden of Roses), a moral work, comprising stories, anecdotes, and observations and reflections in prose and verse; and *Bostân* (the Orchard), a collection of histories, fables, and moral instructions in verse.

**Sa'dowa**, a village on the Bistritz, in Bohemia, not far from Königgrätz. It is celebrated as the scene of the preliminary engagement, on July 3, 1866, between the Austrians under Benedek and the Prussians under Prince Frederick Charles, which culminated in the decisive battle of Königgrätz. The whole conflict is also known as the battle of Sadowa.

**Safe**, a receptacle for valuables constructed of iron or steel, or both combined. A safe to answer all requirements should be fire, explosive, acid, drill, and wedgeproof. A fireproof safe need only be so constructed that, although exposed to the intense heat of a conflagration, its inner recesses remain at a sufficiently low temperature to prevent combustion of the contents. A burglar-proof safe needs many other safeguards, and the history of safemaking is mainly a record of struggles between the safe manufacturer and the burglar; the result is that safes can now be obtained which are all but impregnable. The safe consists of an outer and inner wall, the space between being filled with some fireproof material, such as asbestos, silicate cotton, gypsum, etc. The outside casing, which may be single or compound, naturally receives the greatest attention, and various are the devices of manufacturers to render it sufficiently hard and solid to resist the finely-tempered drills of the burglar. To prevent wrenching, the door is secured by bolts moving straight or diagonally into slots on one

## Safed Koh

or on all sides. These bolts are moved by the door handle, and the lock key fixes them in their positions. With the modern safe of the best kind, the lock may be said to be the only vulnerable point, hence much care and ingenuity have been expended on its mechanism. The first great improvements in locks, as applied to safes, are due to Chubb of London, a name which still stands in the front ranks of safe-lock makers; but numerous patents, mostly of American origin, have in recent years been introduced. Of these the keyless permutation locks deserve particular mention, as they obviate the danger which arises from lost or false keys. Such locks allow of opening only after an indicator has been moved in accordance with a certain combination of numbers arranged before closing the safe. Some safe locks are so constructed that to be freed they require different keys on different days, some can only be opened at a certain hour, this being fixed on before the door is closed; while others again require two or more keys in charge of different persons; in fact, the arrangements contrived to render the plundering of safes next to impossible are too numerous even to mention. The connection of safes with electric alarms in a variety of ways forms another safeguard.

**Safed Koh** ("White Mountains"), a mountain range of Afghanistan. The westerly portion of the chain separates the Herat River valley from the Murghab, while the easterly Safed Koh forms the southern boundary of the Cabul basin. These mountains are quite alpine in their character, and some of the peaks exceed 15,000 ft. in height. Among the spurs of the eastern section are the passes leading from Cabul to Jalalabad, and from Jalalabad to Peshawur famous in the annals of British military expeditions into Afghanistan.

**Safety Lamp**, a lamp for lighting coal mines without exposing the miners to explosions of fire-damp. The first safety lamp was invented by Sir Humphry Davy in 1816, and until a quite recent period his system, with some light modifications, was in general use. It consists principally of a cistern to hold the oil, in the top of which the wick is placed. Over the cistern a cylinder of wire gauze is fixed so as to envelop the flame. The lamp is closed by a bolt passing through both parts, and to prevent the miner from exposing the flame a locking arrangement exists. The diameter of the gauze wire is from  $\frac{1}{10}$  to  $\frac{1}{8}$  of an in., and the apertures do not exceed the  $\frac{1}{2}$  of an in. sq. The Stephenson lamp, better known among miners as the "Geordie," has a glass chimney as well as the wire gauze, and the air to feed the flame enters through a perforated ring just below the wick. This lamp though safer than the Davy, if used with care, becomes a source of danger if the perforated ring is allowed to get clogged and the glass chimney overheated. A safety lamp recently brought before the public is the Thornebury, which is said to be self-extinguishing in an explosive mixture of firedamp and air, to give

## Sagas

a strong light, to be simple in construction, and absolutely safe. There are also several electric miner's lamps in the market.

**Safety Valve**, a contrivance for relieving the pressure of steam before it becomes too great for the calculated strength of the containing vessel. The commonest form of safety valve on steam boilers is a lid (*valve*) pressed against a hole (*seat*) by either a spring or a weight, the spring or weight not exerting a greater force than can be overcome by the pressure of the steam inside, part of which then escapes and obviates any danger. The valve is round, is beveled round the edge, and is furnished with a spindle which moves loosely in a guide attached to the seat; the seat is beveled to fit the edge of the valve. On locomotive and on ships' boilers the valve is pressed against the seat by a spring arrangement; but on stationary boilers a weight should always be employed.

**Safflower** (or Bastard Saffron), a large thistle-like plant with orange-colored flowers, natural order Compositæ. It is cultivated in China, India, Egypt, and in the south of Europe. An oil is expressed from the seeds, which is used as a lamp oil. The dried flowers afford two coloring matters (also called safflower), a yellow and a red, the latter (carthamine) being that for which they are most valued. They are chiefly

used for dyeing silk, affording various shades of pink, rose, crimson, and scarlet. Mixed with finely powdered talc, safflower forms a common variety of rouge. In some places it is used in lieu of the more expensive saffron, and for adulterating the latter. The oil, in large doses, acts as a purgative.



Saffron Crocus.

**Saffron**, a low ornamental plant with grass-like leaves and large crocus-like purple flowers, cultivated in the East and in Southern Europe for the sake of its stigmas. These when dried form the saffron of the shops, which has a deep-orange color, a warm bitterish taste, and a sweetish penetrating odor. Its orange-red extract is used by painters and dyers, and the saffron itself in cookery and confectionery as a coloring and flavoring substance.

**Sagas** ("tales"), the name given to a class of prose epics among the Icelanders; of a mixed character, blending fiction with authentic narrative. Some detail particular events relating to politics or religion, some the history of a particular family, and others the lives of kings and other eminent individuals. Originally they were composed for oral recitation, and prior to the twelfth century they lived only in the memories of the people, hence the varying versions of the same events. Between the twelfth and fifteenth centuries numbers of

## Sagasta

these detached tales were collected, written down, amplified or curtailed, and worked into a series of consecutive narratives. The sagas of the west of the island are most elegant in style, and this circumstance is attributed to Celtic influence. Among the more important sagas are: the *Saga of Gísli*, the outlaw; that of the hero and poet Egill; the *Laxdæla Saga*, the story of the Icelandic heroine Gudrun; the *Saga of Grettir the Strong*; the *Saga of Njal*, a complex saga of great legal and historical value. A number of the most interesting sagas are to be had in English translations.

**Sagasta**, PRAXEDES MATTEO (1827-1903), Spanish statesman, b. at Torrecilla de Cameros, Spain, in 1827. He began life as a civil engineer, but at the age of twenty-seven drifted into politics. In 1854, he was elected in the Constituent Cortes, and has had a hand in most of the exciting events of Spanish history during the last half-century. He took a prominent part in the insurrections of 1856 and of 1866, and after each had to flee to France. Sagasta was successively Minister of State, Minister of Foreign Affairs, Minister of the Interior and President of the Council, 1874. In 1881, he first came to the head of the government and during the remainder of his life was in power much of the time. In December, 1902, he was deposed from the office of premier for the last time, and died at Madrid, Jan. 6, 1903.

**Sage**, RUSSELL, capitalist, b. in 1816 in Oneida co., N. Y. He moved to New York City, and by judicious investments in railroad stocks acquired a fortune. He was elected to Congress in 1853 and again in 1855. In 1891 he just escaped being assassinated by the throwing of a bomb.

**Sage**, a plant of the genus *Salvia* growing in the temperate and warmer regions. They are herbs or shrubs of widely varying habit, usually with entire or cut leaves and various colored (rarely yellow) flowers. The best known is the garden sage. This plant is much used in cookery, and is supposed to assist the stomach in digesting fat and luscious foods.

**Sage Brush**, a low irregular shrub growing in dry alkaline soils of the Western plains.

**Saghalien** (Saghalin) (sa'h'a-lēn), a long island in the North Pacific, separated from Manchuria by the Gulf of Tartary, opposite the mouth of the Amoor; area 24,560 sq. mi. The inhabitants consist of Ainos and other aborigines, Russians, Japanese, etc., altogether some 12,000. The island formerly belonged to the Chinese Empire, but early in this century the Japanese took possession. In 1875 the Russians obtained its cession from Japan. The principal depot is at Alexandrovsk.

**Saginaw**, Saginaw co., Mich., at head of navigation on Saginaw River, 98 mi. n.w. of Detroit. Railroads: Michigan Central; F. & P. M.; and D. L. & N. Industries include shipyards, woodenware, shade roller, wood split pulley factories, roller flouring mills, furniture factories, foundries, machine shops, etc. Also produces 1,000,000 barrels of salt annually. Pop. 1900, 42,345.

## Sahara

**Sago**, a starchy product obtained from the trunk of several species of a genus of palms named *Sagus*. The palm from which the finest sago is prepared, forms immense forests on nearly all the Moluccas, each stem yielding from 100 to 800 lbs. of sago. The tree is about 30 ft. high, and from 18 to 22 in. in diameter. It is cut down at maturity, the medullary part (or marrow) extracted and reduced to powder like sawdust. The filaments are next separated by washing, and the meal laid to dry. For exportation the finest sago meal is mixed with water, and then rubbed into small grains of the size and form of coriander seeds. The Malays have a process for refining sago, and giving it a fine pearly luster, the method of which is not known to Europeans; but there are strong reasons to believe that heat is employed, because the starch is partially transformed into gum. Sago forms a light, wholesome, nutritious food, and may be used to advantage in



Sago Palm.

a.—Inflorescence; b.—fruit.

all cases where a farinaceous diet is required. It is also largely used in the manufacture of soluble cocoas, and for adulterating the common sorts of arrowroot.

**Saguenay** (sag'e-nā), a river of Canada, prov. of Quebec, formed by two outlets of Lake St. John, which unite about 9 mi. below the lake, from which point the river flows s.e., and falls into the St. Lawrence at Tadousac Harbor; length about 100 mi. The river is remarkable for its depth and fine scenery.

**Sagun'tum**, formerly a town in Spain south of the Ebro, about 3 mi. from the coast. It is famous in Roman history, its siege by Hannibal in 219-218 B.C. having given rise to the Second Punic War. The site is occupied by the modern town of Murviedro.

**Sahara** (sa-hā'ra; properly sā'hā-rā), THE, that vast and mainly desert tract of Northern Africa lying north and south of the Tropic of Cancer, between the Atlantic and the Nile. In the north it extends to and forms part of Morocco, Algeria, Tunis, Tripoli, and Egypt; in the south it is chiefly bounded by the Soudan. This immense area, calculated at over 3½ million sq. mi., is not, as popularly supposed, a great level desert; on the contrary, it offers considerable variety of configuration and vegetation. The surface ranges from below sea level to 8,000 ft. above it. There are the extensive and elevated plateaus of Tasili,



## Sahárunpur

Tibesti, etc., about the center of the Sahara, running from the north in a southeasterly direction, and presenting some very high mountain masses. Between Tibesti and the Niger we have the elevated region of Air, and toward the Atlantic, Adrar. These plateaus are intersected by many fertile valleys fit for agriculture and pasture. Other parts of the desert are broken by large oases with a most luxuriant vegetation, such as Twat, Wargla, and Fezzan. On the borders of Algeria oases have been created artificially by means of artesian wells. A vast tract of true desert, El Djuf, lies in the west-central region, and unites all the worst characters of the desert—want of water, intense heat, and moving sands. In the desert proper there is little of animal or of vegetable life. A few species of antelopes, the wild ass, the mountain sheep, the hyena, the baboon, the tortoise, and the ostrich, are met with in favored spots. Lizards, jerboas, and serpents of many kinds retain undisturbed possession of the burning sands. Where herbage exists it is mainly composed of such plants as require but little moisture. The vegetable wealth of the desert dweller lies in the date palm. The population, estimated at about 2½ millions, consists of various tribes of Arabs, Berbers, and negroes. The Berbers are almost confined to the west-central, and the negroes to the east-central parts, while the Arabs predominate in the other regions. Camel breeding, slave and salt dealing, caravan conducting, and brigandage form the chief occupations of a large section. A number of caravan routes through the Sahara connect Timbuctoo and the Soudan with the maritime countries in the north. Recent explorations have finally disposed of the idea that the Sahara is the dried-up bed of a former inland sea, and that it could be restored to its former condition by admitting the waters of the ocean. The diluvial sea theory is now limited to the low-lying districts, El Djuf and Kufra, which abound in rock salt deposits. Spain annexed in 1887 the coast between Morocco and Senegal, and by treaty with the Adrar sheiks secured considerable territory inland.

**Sahárunpur** (sa-hä-ran-pur'), a town in Hindustan, capital of the district of the same name, in the Northwest Provinces. It has a large sugar and grain trade. Pop. 59,194.

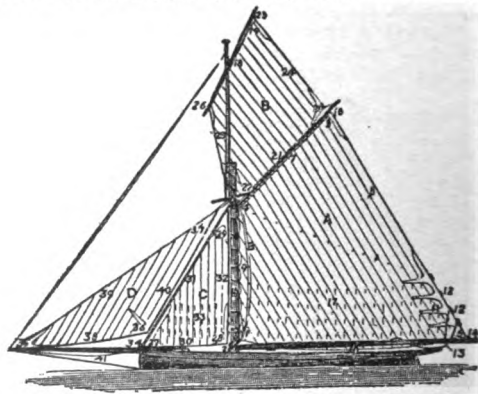
**Sahib**, the usual term of address by natives of India toward a European gentleman.

**Saigon** (sī-gon'), capital of French Cochinchina, of which it is the chief trading emporium, on the right bank of the river of the same name, 35 mi. from its mouth in the China Sea, one of the finest cities in the East. Saigon is connected by canal with the Me-kong, and by rail with Mytho, situated on one of the arms of that river. The Saigon River is navigable, even at ebb tides, by the largest vessels up to the town, and an active trade with China, Siam, Singapore, Java, etc., is carried on, rice being the staple article of export. The pop., including Cholon, is about 60,000.

**Sail**, a piece of cloth or tissue of some kind spread to the wind to impel or assist in im-

## St. Augustine

PELLING a vessel through the water. Sails are usually made of several breadths of canvas, sewed together with a double seam at the borders, and edged all round with a cord or cords called the *boltrope* or *boltropes*. A sail extended by a yard hung by the middle is called a *square sail*; a sail set upon a gaff, boom, or stay, so as always to hang more or less in the direction of the vessel's length, is called a *fore-and-aft sail*. The upper part of every sail is the *head*, the lower part the *foot*, the sides in general are called *leeches*. The lower two corners of a square sail are in general called *clues*, and are kept extended by ropes called *sheets*. Sails generally take their names, partly at least, from the mast, yard, or stay upon which they



Sails of a Cutter Yacht, with the name of the different parts.

**MAINSAIL, A.**—1, main tack; 2, main tack tackle; 3, main tack tricing line; 4, neck or throat; 5, peek; 6, clew; 7, head; 8, leech; 9, luff; 10, foot; 11, strengthening pieces; 12, cringles; 13, reef pen-nants rove; 14, main clew lashing; 15, mast hoops and seizings; 16, peak earring; 17, reef knittles or points.

**GAFF TOPSAIL, B.**—18, head; 19, peak; 20, clew; 21, foot; 22, tack; 23, luff; 24, leech; 25, peak earring; 26, head earring.

**FORESAIL, C.**—27, fore tack; 28, clew; 29, head; 30, foot; 31, luff; 32, leech; 33, reef knittles or points; 34, fore tack tackle rove through a sheave in stem head.

**JIB, D.**—35, tack, hooked on to the traveler; 36, clew; 37, head; 38, foot; 39, luff; 40, leech; 41, inhaul of the traveler.

are stretched; thus, the main-course, main-top sail, main-topgallant sail, are respectively the sails on the mainmast, main-topmast, and main-topgallant mast.

**Saint Albans**, Franklin co., Vt., 30 mi. n.e. of Burlington. Railroad, Central Vermont. It is the center of variegated marble quarries. Industries include railroad repair and car shops. Ships large quantities of butter and cheese to Boston and other markets. Pop. 1900, 6,239.

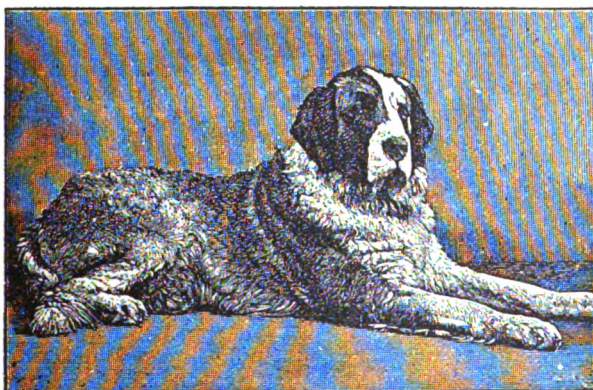
**St. Augustine**, St. Johns co., Fla., on Matanzas Sound, 30 mi. s.e. of Jacksonville. Railroads: J. St. A. & I. R., Florida & E. Coast, and others. It is a popular winter health resort and a trade center for the surrounding district. It is the oldest town in the U. S., having been founded by the Spaniards in 1565,

## St. Bernard

ceded to Great Britain in 1763, and to the U. S. in 1812. Industries, cigar factories. Pop. 1900, 4,272.

**St. Bernard**, a breed of dogs which derives its name from the hospice of St. Bernard, where it was first introduced for the purpose of finding the pass across the mountain in snow. Every morning during the winter two dogs, one old and one young, accompanied by one or more of the monks or attendants, started from the monastery for the shelter at the foot of the mountain on the Italian side; a similar party of men and dogs also descended to the shelter at the Swiss end of the pass. If any travelers were found there they were helped on their way to the hospice, the dogs going on before to show the road.

The St. Bernard, according to the traditions of the monastery, is the result of a cross between a Danish bull bitch and a mastiff, a



St. Bernard Dog.

native hill dog, though at what time effected it is impossible to say. About 1860 these dogs first attracted the attention of English travelers, who took them to England, where they were exhibited and at once excited much notice on account of their size and beauty. Others were introduced, and the St. Bernard was soon established as the most popular big dog, a popularity which has gone on increasing. The St. Bernard, as bred to modern English ideas, is an immense, red or orange colored dog, marked with white on muzzle, neck, chest, feet, and tip of tail. The head should be massive and imposing, with a strong, square muzzle, a point of great importance. Legs should be straight, with large feet, and double, or at least, single dew claws. Hind feet should turn out, though not sufficiently to hinder the dog's movements. The coat of the rough variety is of medium length; it should not be too curly. In the smooth variety the coat should be short and wiry. Many of the finest St. Bernards measure over 30 inches high at the shoulder, and weigh over 150 lbs. On account of his great size and weight the St. Bernard often moves in an awkward manner, a defect which should be avoided. St. Bernards, though occupying a great deal of space, are so hand-

## St. Ignatius College

some that they are kept as companions in great numbers; as a rule they are good tempered, though many are not to be trusted.

**Saint Catharine's**, a town of Canada, prov. Ontario, 12 mi. n.w. of Niagara Falls, and near Lake Ontario. It is celebrated for its mineral springs (artesian), is the center of a large and increasing trade, and contains flour and saw mills, foundries, etc. Pop. 9,170.

**Saint Clair**, a lake in North America, situated between Lake Huron and Lake Erie, and connected with the former by St. Clair River, with the latter by Detroit River. It is 30 mi. long, greatest breadth 24 mi., area 360 sq. mi. It contains several fine islands. The river Saint Clair, which separates Canada and the U. S., is about 40 mi. long 1 mi. wide and navigable.

**St. Cloud**, Stearns co., Minn., 75 mi. n.w. of St. Paul, on the Mississippi River. Railroads: Great Northern, and Northern Pacific. Seat of state normal school and state reformatory. Granite quarries in the vicinity, also the center of a farming and lumbering district. The factories, furnished with abundant water power, produce flour, lumber, wagons, etc. Pop. 1900, 8,663.

**St. Charles**, St. Charles co., Mo., on Missouri River, 22 mi. w. of St. Louis. Railroads: Wabash, and C. S. L. & K. C. Industries: car manufacturing works, tobacco, brick and tile factories, etc. Pop. 1900, 7,982.

**Saint Elias**, MOUNT, a mountain situated on the boundary between British North America and Alaska, about 25 mi. from the Pacific Ocean. It rises 19,500 ft.

**St. Francis Xavier**, COLLEGE OF, a Roman Catholic institution of higher learning in New York City, founded in 1847 by the Jesuit Fathers. It comprises the college, the graduate school and the high school. In 1904 it had 33 instructors, 562 students and a library containing 101,000 volumes. The president is Rev. D. W. Hearn, S. J.

**St. Gaudens**, AUGUSTUS, an American sculptor, b. in 1848 in Dublin. Among his statues are *Admiral Farragut*, in New York; *Abraham Lincoln*, in Chicago; and the statue of *Diana*, which was placed on the roof of the Agricultural Building at the World's Columbian Exposition in Chicago, in 1893.

**St. Ignatius College**, an institution at Chicago, Ill., for secular and ecclesiastical education, under the control of the Jesuit Fathers, founded in 1869, since which time it has had an annual increase of students. The number in 1904 exceeded 600. Its curriculum embraces logic, metaphysics, theology, ethics, mathematics, astronomy, chemistry, geology, Greek, Latin, modern languages, elocution and English literature. Its faculty comprises some of the ablest members of the learned Jesuit Order. The president is Rev. Henry J. Dumbach, S. J.



## Saint John

**Saint John**, a city and port of Canada, province New Brunswick, capital of St. John county, at the mouth of the river of the same name, which here enters the Bay of Fundy. The harbor is commodious, spacious, never freezes, and is well protected by batteries. St. John is the great commercial emporium of New Brunswick, and has in particular a great trade in lumber. The fisheries are very important, and shipbuilding and a variety of other industries are briskly carried on. The city was founded by American loyalists in 1783, after the Revolution. Pop. 39,179.

**Saint John**, a river partly belonging to the U. S., partly to Canada, the last 230 mi. of its course being in New Brunswick; total length 550 mi. It is navigable for large steamers to Fredricton, a distance of 80 mi. About 225 mi. up are the Grand Falls 75 ft. high.

**Saint John's**, capital of Newfoundland, on Avalon Peninsula in the southeast. It is attractively situated at the inner end of an excellent and capacious harbor, and is protected by several strong batteries and forts. Cod and seal oils are produced and exported on a large scale. Pop. 28,610.

**St. Joseph**, county-seat of Berrien co., Mich., on Lake Michigan, and the C. & W. R. and the Vandalia railroads; 2 m. s.w. of Benton Harbor with which it is connected by an electric railway; has a large trade in fruit and lumber; is a noted summer resort. Pop. 1900, 5,155.

**St. Joseph**, county-seat of Buchanan co., Mo., on the Missouri river. Railroads: C. R. I. & P.; Missouri Pacific; C. B. & Q.; C. St. P. & K. C.; St. J. & G. I.; K. C. St. J. & C. B., and St. J. St. L. & S. F. Seat of the state insane asylum. Industries include the largest factory for men's shirts and overalls in the U. S., the manufacture of harness, boots and shoes, furniture and machinery. The city has a large trade in cattle, hogs, corn, oats and wheat. Pop. 1900, 102,979.

**Saint Just** (sag-zhüst), ANTOINE LOUIS LÉON FLORELLE DE (1767-1794), one of the most prominent men in the French Revolution. He adopted with enthusiasm the principles of the Revolution, became the right hand of Robespierre, and one of the most energetic and resolute members of the Mountain party. The guillotine was his general answer to all arguments and actions which did not harmonize with his own. He fell with Robespierre, and perished on the same scaffold with him.

**St. Louis**, St. Louis co., Mo., on Mississippi River, about 21 mi. below the mouth of the Missouri River. Railroads: It has eighteen lines of railroad, including nearly all trunk lines running west. Here are located many important institutions, including the Washington and the St. Louis universities, the Shaw Botanical Gardens, the Christian Brothers' College, St. Louis Law School, Beaumont Hospital Medical College, and others. There are twelve daily and sixty-two weekly papers. It is the seat of large manufacturing interests, the manufactured articles including tobacco, flour, beer, plate glass, stoves, agricultural im-

## Saint Maurice

plements, chairs, saddles, carriages, boots and shoes, iron goods, brick, white lead, linseed and cotton-seed oil, etc. There is a large commerce in live stock, coal, grain, cotton, and hog products. St. Louis was originally an Indian trading post, founded by Pierre Laclède Linguette in 1764. The settlement was under French auspices, and it remained under their control until 1803, when the territory of Louisiana was purchased by the U. S. The settlement was incorporated as a town in 1809. The headquarters of John Jacob Astor's trading quarters were established in 1819 and the town received a city charter in 1822. Its growth from this time has been rapid, though checked by many reverses, among which may be mentioned floods, 1785 and 1844; financial distress, 1837 and 1847; cholera, 1832 and 1848; fire of 1849, and the cyclone of 1896. The exceptional commercial location of St. Louis has made it one of the leading cities of the U. S. Besides its location on the Mississippi River it is on the following railroads: C. B. & Q.; J. S. E.; I. & St. L.; L. E. & St. L.; Missouri Pacific; L. & N.; M. & O.; St. L. & S. F.; Ohio & Mississippi; St. L. A. & T. H.; St. L. I. M. & S.; St. L. K. & N. W.; T. St. L. & K. C.; Wabash; Vandalia; St. L. K. C. & C.; and Illinois Central. It is one of the ports of delivery of the New Orleans custom district. The parks of St. Louis form one of its chief attractions; there are in all twenty-two parks, with an area of about 2,500 acres. The principal ones are Forest Park, Tower Grove Park, and the Shaw Botanical Gardens. The most interesting feature of St. Louis is the great stone, iron, and steel bridge, known as the Eads Bridge, over the Mississippi River, connecting St. Louis with East St. Louis. It was completed in 1874 at a cost of \$10,000,000. (See *Bridge*.) The Merchants' bridge, crossing the river 3 m. above the Eads bridge, was built in 1890 at a cost of \$3,000,000. Among public buildings of note are the new city hall, cost \$2,000,000; the Four Courts, planned after the Louvre, Paris; the State Insane Asylum; U. S. government building, cost \$6,250,000; Chamber of Commerce built of sandstone in the Renaissance style, cost nearly \$2,000,000; Museum of Fine Arts; Mercantile Club; Public Education building, and the Exposition building. In 1904, a world's fair will be held in St. Louis to celebrate the Louisiana Purchase Centennial. Pop. 1900, 575,238.

**St. Louis**, UNIVERSITY OF, a Roman Catholic university established at St. Louis, Mo., in 1829 by the Jesuit Fathers. It comprises collegiate, preparatory, military, philosophical, medical and theological departments. It has 130 instructors and about 1,000 students. The president is W. B. Rogers, S. J.

**St. Mary's River**, the channel connecting Lake Superior with Lake Huron, having more the character of a lake than a river. At Sault St. Marie, or St. Mary's Falls, there is a fall of 18 ft., and to enable vessels to avoid this a canal has been made through Michigan.

**Saint Maurice**, a river of Canada, prov. Quebec, which enters the St. Lawrence at Three



## St. Paul

Rivers have a course of about 300 mi. through fine scenery and extensive forests. About 22 mi. above its mouth are fine falls 160 ft. high.

**St. Paul**, co. seat of Ramsey co., Minn., and state capital; port of entry on both sides of the Mississippi river; 410 m. n. w. of Chicago. It is an important railway center, from which extend seven eastern trunk lines and four transcontinental systems. Some of the principal lines are the C. M. & St. P., C. & N. W., B. & N., C. & G. W., Wisconsin Central, Minn. & St. L., the "Soo" line, the Northern Pacific, Great Northern, Canadian Pacific and Union Pacific. The St. Paul & Duluth, the Eastern Minnesota and the Omaha all have lines extending from St. Paul to the head of Lake Superior, and a very large part of the commerce of St. Paul with the east is over the lake route. Electric railways connect the city with Minneapolis and with Stillwater. Two lines of river steamers connect the city with the lower Mississippi. St. Paul was founded in 1838 by a French Canadian, Father Gaultier; a township was formed in 1847, and a city government was obtained in 1854. The suburb of West St. Paul was added in 1874, since which the growth has been very rapid. The suburbs now join those of Minneapolis (which see). The city owes its early growth to its situation at the head of navigation on the Mississippi. The value of manufactures in St. Paul for 1900 was \$38,541,030. It is an important fur manufacturing center. It also leads the cities of the state in the factory manufacture of boots and shoes and of men's clothing, in printing and publishing and in railroad repair shop work. The city does a large jobbing business (about \$150,000,000 annually). The notable buildings of St. Paul are United States Government building, the Pioneer Press, Manhattan, New York Life, Germania Life, Globe and Endicott buildings. The State Capitol, begun in 1896, cost about \$4,000,000. The city is built on three plateaus, the lowest being the river flats. The business portion is on a plateau above the river flats, while the finest residences are built on a range of irregular bluffs on the third plateau. Summit avenue is one of the finest residence streets in America. There are many parks, including Como Park, a beautiful pleasure ground of 377 acres. The city has excellent public schools and numerous charitable institutions. It is the seat of Hamline University, Macalester College, St. Paul's Seminary and Concordia College. Pop. 1900, 163,065.

**St. Petersburg**, capital of the Russian empire, seat of government and residence of the czar; was founded in 1703 by Peter the Great. It covers an area of 21,195 acres, upon plains which were formerly malarious marshes, but are now for the most part drained and laid out in meadows and gardens. The climate is severe in winter, but mild and delightful in summer. Still, in spite of the extensive drainage, it is unhealthy, fevers being frequent. The Great Neva divides the city into two great sections, the Petersburg side, situated on numerous small islands, and the Great side, lying toward the south on the mainland. The two sections are

## Saint-Pierre

connected by one permanent bridge, the Nikolaievski, and several boat bridges, used only in summer. Fourteen arms of the Neva and seven canals ramify the city. Of the 150 bridges uniting the islands, the Annitchkoff, across the Fontanka canal, is the finest. The Great side is the more elegant part of the city, containing most of the palaces, churches and government buildings. The Petersburg side is devoted chiefly to commercial and industrial interests. Admiralty Square, on the south bank of the Neva, facing the English quay, is in the center of the city. Leading southeastward from the Admiralty Square is the Nevski Prospekt, which is lined with imposing palaces, and is one of the finest streets in the world. The streets in general, architecturally considered, present a rigid military aspect, with the houses drawn up in regular lines of gloomy gray, or massed together in solid phalanxes. St. Petersburg is sometimes called the "City of Palaces." The Winter Palace is the largest and, perhaps, the most magnificent palace in the world. The Hermitage, which is connected with the Winter Palace, has a fine library and picture gallery containing many rare paintings by Rubens, Rembrandt, Vandyke and Teniers. Other splendid palaces are the residence of the Grand Duke Michael and the Annitchkoff Palace. The castle in which Peter the Great lived is still preserved. Peter's Square contains the famous equestrian statue of Peter the Great. In the Palace Square stands Alexander's column 150 high, built of granite. Within the citadel is the Cathedral of St. Peter and St. Paul, where the Russian czars are buried. Among the many other magnificent churches are the Church of St. Isaac and a memorial church to Alexander II. Other buildings are the Admiralty, the arsenal, the custom house and the fortress of Petropavlosk (the Russian bastille). Educational institutions are the Academy of Sciences, the University of Russia, the Institute of Technology and the National Museum. The Imperial Library is one of the finest in Europe. St. Petersburg is the most important manufacturing city of Russia. Among the manufactures are porcelain, malachite ware, Itoberlin tapestry and embroidery and fire arms. The annual output is estimated at \$72,000,000. The city is 1 m. e. of its port, Cronstadt, but a maritime canal from Cronstadt permits vessels drawing up to 20 feet of water to reach the quays of the city. A system of canals furnishes communication with the interior. Railways connect the city with Moscow, Warsaw and Berlin. Its exports and imports have each an annual value of about \$45,000,000. St. Petersburg is now one of the finest European capitals. Pop. 1900, 1,267,023.

**Saint-Pierre** (san-pi-är), JACQUES HENRI BERNARDIN DE (1737-1814), a French author. He learned engineering, and in the capacity of engineer worked in Malta, Russia, Germany, and for about three years for the French government in Mauritius. Having returned to France he betook himself to literature. His *Etudes de la Nature*, published in 1783, first secured

## Saint-Simon

him a literary position. Then followed his chief works *Paul et Virginie* and *Chauvrière Indienne*, both of them (especially the former) very popular.

**Saint-Simon** (saŋ-sē-mōŋ), CLAUDE HENRI, COMTE DE (1760-1825), founder of a philosophico-religious sect of socialists, was b. at Paris. At the age of eighteen he entered the army and served in the closing campaigns of the American war. He took no active part in the French Revolution, which, indeed, caused him the loss of his own property; but he speculated in the national domains created by the confiscation of the landed property of the nobility and clergy, and thus by 1797 had realized a considerable fortune. He had by this time, it is said, conceived the idea of regenerating humanity, and in order to qualify himself for this great task he engaged in extensive studies, and traveled in England and Germany. During the ten years 1803-13 he wrote a number of works on scientific and political subjects, in which may be traced the gradual development of his socialistic theories, which found more definite expression in his subsequent and more important writings, such as *L'Industrie ou Discussions Politiques, Morales et Philosophiques* (1817-18), and *Parabole* (1819). Augustin Thierry, Saint Aubin, and August Comte, who had become his disciples, collaborated in these later volumes. Finding the difficulty of procuring the means of subsistence and of publishing his works increasing, he attempted suicide by shooting (1823), but recovered with a mutilated visage and the loss of an eye. He lived for about two years after this; long enough to finish his chief work, *Le nouveau Christianisme*. St. Simonism is the name given to his socialistic doctrines.

**Saint Simon**, LOUIS DE ROUVROY, DUKE DE (1675-1755), French writer. He possessed the esteem and to some extent the confidence of Louis XIV, and of the Duke of Orleans, but his spirit of independence, severe morality, and peculiar views about the mission of the aristocracy, made him unpopular at the court. Nevertheless he succeeded in getting himself well informed about all the court cabals, and the doings and sayings of almost every notable personage of the France of the period. This information he deposited in his *Mémoires*, published posthumously, and which have made him famous. The first complete edition appeared in Paris in 1829-31.

**St. Thomas** (or S. Thomé), a West African island, in the Gulf of Guinea, belonging to Portugal. Area 355 sq. mi.; pop. 18,266; capital same name on the northeast coast. There is a lofty mountain in its center, culminating in St. Thomas's Peak, over 6,000 ft. high. Coffee plantations have taken the place of the former sugar plantations; and cocoa, vanilla, and cinchona are raised in increasing quantities. The climate is unhealthy for Europeans.

**St. Thomas**, a West Indian island, belonging to Denmark, one of the Virgin group, 36 mi. e. of Porto Rico. Area 23 sq. mi.; pop. 14,389; capital, Charlotte Amalia, on the south

## Saladin

side of the island, with a safe and commodious harbor, dock, fort, etc. St. Thomas was till recently an important center of West Indian trade, being a place of call for numerous steamers. Sold to the U. S. in 1902.

**St. Thomas**, Elgin-co., Ontario, Canada, on Michigan Central and Canadian Pacific Railroads. Pop. 10,370.

**St. Vincent**, a British West Indian island, in the center of the Windward group. Area 122 sq. mi.; pop. 46,776; capital, Kingstown, on a bay of the same name near the southwest extremity of the island, with a pop. of 5,593. In the northwest is an active volcano, called the Souffrière, about 3,000 ft. high, with an immense crater; an eruption in 1872 caused great damage in the island. Chief exports, sugar and arrowroot. St. Vincent was discovered by Columbus in 1498, and first became a British Colony in 1763; between 1779 and 1783 it was held by the French.

**St. Vincent**, CAPE, a promontory forming the southwestern extremity of Portugal. It is celebrated in naval history for the great victory gained here in 1797 by the British admiral Sir John Jervis over a Spanish fleet nearly twice the strength of his own.

**Säl** (säl), one of the most valuable timber trees of India, growing to the height of 100 ft. Extensive forests of it exist in Northern India, where it is largely used in carpentry of all kinds, the wood being light brown in color, hard, and uniform in texture. It yields a whitish, aromatic, transparent resin (sometimes called dammar), used to calk boats and ships, and also for incense. The säl forests are now protected by government.

**Sala**, GEORGE AUGUSTUS, a journalist and author, b. in London, 1828. His father was an Italian, and his mother an actress and singer of West Indian extraction. He studied for art, but early embraced literature. His principal works are, *Twice Round the Clock*, *The Hours of the Day and Night in London*, *Seven Sons of Mammon*, *My Diary in America in the Midst of War*, *From Waterloo to the Peninsula*, *Cookery in Its Historical Aspects*. D. 1895.

**Sal'adin** (or properly Salah-ed-din) (1137-1193), a celebrated sultan of Egypt and Syria. His father, a native of Surdistan, was governor of Tekrit (on the Tigris). He early distinguished himself as a soldier, became vizier to the last of the Fatimite caliphs in succession to his uncle Khirkuh, and on the caliph's death in Egypt Saladin usurped his wealth and authority, with the approval of Nureddin, the sultan of Damascus. After the latter's death, Saladin succeeded also in possessing himself of Damascus and Southern Syria. He rapidly extended his conquests over Syria and the neighboring countries, and thus came in contact with the Crusaders during the third Crusade. In 1187 he gained the famous victory of Tiberias, and Jerusalem surrendered to him after a gallant resistance. But the fall of Acre in 1191 after a two years' siege, and the defeats at the hands of Richard I, compelled Saladin to conclude a truce, which was followed by the withdrawal of

## Salado

**Richard.** About a year after this event Saladin d. at Damascus. He was a skillful, brave, and magnanimous general; and an astute, beneficent, and merciful ruler. Saladin was the founder of the dynasty of the Ayoubites.

**Salado,** a river of the Argentine Republic, which rises on the eastern slopes of the Cordilleras, and falls into the Paraná after a course of 750 mi.

**Salaman'ca,** a city in Spain, capital of a province of the same name, 120 mi. northwest of Madrid, on and between three hills, and on the river Tormes. In picturesqueness, and in the magnificence of its ancient edifices, Salamanca is hardly surpassed by any other Spanish city. Chief among the numerous attractions rank the cathedral (sixteenth century), a splendid example of florid Gothic; the old cathedral, erected 1102, in Romanesque style, the university, the college of the Jesuits, King's College, and churches. The university is one of the oldest and most celebrated in Europe, and when at its zenith in the sixteenth century attracted some 15,000 students from all parts of Europe. *Salmanica*, the ancient Salamanca, was taken by Hannibal in 222 B.C., and under the Romans it became a military station. It has been the theater of many interesting historic events, but in modern times it is chiefly celebrated for the victory gained in its vicinity on July 22, 1812, by the Anglo-Portuguese army under the Duke of Wellington, over the French under Marshal Marmont. Pop. 17,155. The province of SALAMANCA, chiefly formed by the Douro basin, has an area of 4,940 sq. mi., and a pop. of 311,428. It is rich in oak and chestnut forests and cereals, and produces wine, oil, and hemp.

**Salaman'der,** the name given to various animals, included in the class Amphibia (frogs, toads, newts, etc.), and found in Europe and especially in North America. The salamanders may be divided into the land salamanders and the water salamanders, efts or newts. The land salamanders have an elongated lizard-like form, four feet, and a long tail. The skin is warty, with many glands secreting a watery fluid, which the animal exudes when alarmed. As this fluid is injurious to small animals the



The Spotted Salamander.

salamanders have the reputation of extreme venomousness, though they are in reality entirely harmless. The best known species is the common salamander of Europe. It is 6 to 8 inches long, is found in moist places under stones or the roots of trees, near the borders of springs, in deep woods, etc., and passes its life in concealment except at night or during rain. It is sometimes called the *spotted salamander*,

## Salerno

from the bright yellow stripes on its sides. In America the name is often given to the menopome. Salamanders feed on worms, slugs, snails, and insects. The old legend that salamanders could live in the midst of fire is, like their venomousness, a fiction, although it is possible that the watery secretion of the skin might enable these animals to resist heat with impunity for a longer period than other forms.

**Sal'amis** (or Koluri), an island of Greece, in the Gulf of Ægina, close to the shore of Attica. It has a rocky surface, a thin but not unproductive soil, and in some parts is well adapted for the olive and vine. The celebrated battle, B. C. 480, in which the vast and unwieldy Persian fleet under Xerxes was signally defeated by a much smaller Grecian fleet, was fought here.

**Sal-ammoniac,** the chloride of ammonium, now generally obtained from the refuse of gas works. It is used in calico-printing, in galvanizing iron, in soldering, in batteries, etc.

**Salawatty,** an island off the western extremity of New Guinea, to the Dutch portion of which it is regarded as belonging; area about 750 sq. mi.; pop. 5,000.

**Saldanha Bay** (sal-dan'ya), a bay of the Atlantic, on the w. coast of Cape Colony, South Africa, 80 mi. n. of Cape Town. It forms a fine natural harbor, with excellent shelter and anchorage at all seasons, but is at present little frequented on account of scarcity of water and fuel.

**Salem,** Columbiana co., O., 70 mi. s.e. of Cleveland. Railroads: P. Ft. W. & C., and Salem. Industries: engine co., two flouring mills, two stove foundries, church organ, pump, sheet metal works, furniture, carriage, ice, wire nail, and other factories. Surrounding country agricultural and mineral. The town was first settled in 1806 and became a city in 1888. Pop. 1900, 7,582.

**Salem,** Essex co., Mass., on the Atlantic Ocean 14 mi. n.e. of Boston. Railroad, Boston & Maine. It is the seat of Essex Institute, Peabody Academy of Sciences, the East India Marine Hall, a state normal school for girls, etc. Industries: cotton manufacture, white lead, jute, car, cordage, and lead pipe works. It is a port of entry and one of the oldest towns in the state; has a large coasting trade. Pop. 1900, 35,956.

**Salem,** Salem co., N. J., 35 mi. s.w. of Philadelphia. Railroad, West Jersey. It is the center of an agricultural district. Industries include a foundry, hosiery and shirt factories, canneries, glass factory, etc. Population, 1900, 5,811.

**Salem,** a district and town of Hindustan, Madras presidency. Area of district 7,653 sq. mi.; pop. 1,599,595. It consists partly of a tract below the Ghâts, but chiefly of a fine table-land, rising in many parts to between 5,000 and 6,000 ft. above the sea, much frequented by Europeans. Salem, the capital, has a pop. of 50,667.

**Sal'er'no** (anciently *Salernum*), a town and seaport of Italy, capital of the province of the same name, on the Gulf of Salerno, 30 mi. s.e.



## Saleyer Islands

of Naples. It has an excellent marine promenade and a cathedral dating from the eleventh century. Its university (established 1150, abolished 1817) was famous in the Middle Ages, especially in medicine. It was a place of great importance under the Romans, Goths, Lombards, and Normans. Silk and cotton are manufactured. Pop. 22,328. The province has an area of 2,126 sq. mi., and a pop. of 566,870.

**Saley'er Islands**, a group of islands in the Indian Ocean, south of Celebes, from which Great Saleyer is separated by the Saleyer Strait. They are about thirty in number; have a pop. of about 50,000 Mohammedan Malays governed by native rajahs under a Netherlands agent. Ebony, teak, indigo, coffee, earth fruits, and cotton are among the products.

**Salford**, a municipal and parliamentary borough of England, in Lancashire, which may be considered an integral portion of Manchester, though it has a mayor and corporation of its own, and a distinct parliamentary constituency returning three members. Pop. 198,136.

**Sal'ians** (or Salian Franks), is the name given to that section of the Franks who from the third to the middle of the fourth century were settled on the left bank of the Lower Rhine. Their origin is uncertain, but we know that the earliest Frankish kings were Salian Franks.

**Salic Law**, the code of laws of the Salian Franks. One of the laws in this code excluded women from inheriting certain lands, probably because certain military duties were connected with the holding of those lands. In the fourteenth century females were excluded from the throne of France by the application of this law to the succession to the crown, and it is in this sense that the term *salic law* is commonly used.

**Salicyl'ic Acid**, an organic acid of a sweetish-sour taste, without smell, possessing great antiseptic and anti-putrefactive properties. It occurs in nature in the flowers of the meadow-sweet, and in the whortleberry; but that preferred by the medical profession is procured from the oil of the wintergreen (*Gaultheria procumbens*). There are now several processes for manufacturing salicylic acid on a large scale, and it forms an important article of commerce. It is largely employed in medicine, having properties similar to those of quinine, and is given in acute and chronic rheumatism, used as a lotion in irritation of the skin, etc. A salt prepared from it, salicylate of sodium, is often preferred.

**Salina**, Saline co., Kan. Railroads: Union Pacific; A. T. & S. F.; M. P. & C.; and R. I. & P. Industries: flour mills, carriage works, broom and mattress factories, foundry and machine shops, etc. There are salt springs, and gypsum quarries in vicinity. It is the seat of the Kansas Wesleyan University, and the Salina Normal University. Pop. 1900, 6,074.

**Salisbury**, ROBERT ARTHUR TALBOT GASCOYNE CECIL K. G., THIRD MARQUIS OF (1830-

## Salmon

1903), English statesman, was b. at Hatfield (county of Herts), and educated at Eton and Oxford. As Lord Robert Cecil he entered Parliament as member for Stamford in 1853, and gradually made his way till in 1866 on the formation of Lord Derby's third administration, he was appointed secretary of state for India. He resumed the secretaryship for India, in the Disraeli government of 1874. He took part in the conference of Constantinople, which was expected to settle the dispute between Russia and Turkey; and at the end of that war, having become foreign minister, he insisted on the treaty which Russia had forced on Turkey being submitted to a congress of the powers. In 1878 he accompanied Disraeli to the congress at Berlin, and on the death of that statesman became the recognized leader of the Conservative party. He became premier as well as foreign secretary on the fall of the Gladstone government in 1885. In 1892 the majority in Parliament being in favor of a Home Rule bill for Ireland, Salisbury retired from office. He was re-appointed in 1895, retired in 1902 and died Aug. 22, 1903.

**Sali'va**, the transparent watery fluid secreted by glands connected with the mouth. The quantity secreted in twenty-four hours varies; its average amount is probably from 1 to 3 pints. The purposes served by saliva are mechanical and chemical. It keeps the mouth in a due condition of moisture, and by mixing with the food during mastication it makes it a soft pulpy mass, such as may be easily swallowed. The chemical action of saliva on the food is to convert the starchy elements into some kind of sugar. The salivary glands are compound tubular glands known as the *parotid*, the *sub-maxillary*, and the *sub-lingual*, and numerous smaller bodies of similar structure and with separate ducts, which are scattered thickly beneath the mucous membrane of the lips, cheeks, soft palate, and root of the tongue. Salivary glands are absent in some mammals and reptiles, and in most fishes.

**Sallust** (CAIUS SALLUSTIUS CRISPUS) (B.C. 86-B.C. 34), a Roman historian, b. at Amiternum. He became tribune in B.C. 52, and in the civil war sided with Cæsar. In B.C. 47 he was prætor elect, and in the following year accompanied Cæsar to the African war, where he was left as governor of Numidia. He returned with immense wealth, was accused of maladministration and oppression, and after Cæsar's death lived in luxurious retirement. Sallust wrote several historical works in a clear and concise style. His *Bellum Catilinarium* is a history of the Catiline conspiracy. The *Jugurtha*, or *Bellum Jugurthinum*, is a history of the war against Jugurtha, king of Numidia, from B.C. 111 to B.C. 106.

**Salmon**, a well-known fish, inhabiting both salt and fresh waters; it ranks prominent among the food fishes of U. S. and other countries. It generally attains a length of from 3 to 4 ft., and an average weight of from 12 to 30 lbs., but these limits of size and weight are frequently exceeded. The typical

## Salmon

color of the adult fish is a steel blue on the back and head, becoming lighter on the sides and belly. Teeth are present in the upper and lower jaws, palate, and roof of the mouth; the edges of the tongue are also toothed or notched. The food consists of animal matter, and must vary with the change of habitat from salt to fresh water, and *vice versa*. In the autumn the salmon quits the sea and ascends the rivers for the purpose of spawning, often having to surmount considerable obstacles, such as falls of some height, in its progress, and in so doing has been known to spring 14 ft. out of water and describe a curve of 20 ft. In many streams they are now assisted in this by artificial structures known as "salmon ladders," or the like. The eggs are deposited in a shallow trough or groove excavated in the gravelly bed of the river. In from 70 to 150 days the young fish emerges from the egg, and in its embryo state it is not unlike a tadpole, being on the average about one and a quarter



Salmon.

in. in length. It usually continues in the shallows of its native stream for two years after hatching, and during this period it attains a length of 8 in. When the season of its migration arrives, generally between March and June, the fins have become darker and the fish has assumed a silvery hue. It is now known as a *smolt* or *salmon fry*. The smolts now congregate into shoals and proceed leisurely seaward. On reaching the estuary they remain in its brackish water for a short time and then make for the open sea. Leaving its native river as a fish, weighing it may be not more than 2 ozs., the smolt, after three months' absence, may return to fresh water as a *grilse*, weighing 4 or 5 lbs. In the grilse stage or *salmon peel*, as it is sometimes called, the fish is capable of depositing eggs. After spawning in the fresh water the grilse again seeks the sea in the autumn, and when its second stay in the ocean is over it returns after a few months' absence as the adult salmon, weighing from 8 to 10 lbs. The salmon returns as a rule to the river in which it passed its earlier existence. The fertility of the fish is enormous; it has been calculated that over 150,000,000 of salmon ova are annually deposited in the Scotch river Tay alone, and of these only about a third come to life and attain the parr stage, while of these parrs only 20,000,000 become smolts; and in time only 100,000 remain as perfect salmon, of which 70,000 are caught and 30,000 left for breeding purposes. Salmon are caught by the rod, and by means of nets.

What is known as the "land-locked" salmon, which is found in Norway, Sweden, Maine, and New Brunswick, and is so called because it remains in inland waters and does

## Salt

not descend to the sea, is by some regarded as a distinct species from the common salmon, by others not. In the waters of Northwestern America are several salmon belonging to a distinct genus, including the quinnat or king salmon, blue-black salmon or red fish, silver salmon, dog salmon, and hump-back salmon. The quinnat has an average weight of 22 lbs., but sometimes reaches 100 lbs. Both it and the blue-black salmon are caught in immense numbers in the Columbia, Sacramento, and Frazer (especially in spring), and are preserved by canning. The flesh of these salmon is indistinguishable from that of the common form. The salmon is one of the fishes that are important objects of pisciculture, and various species of the family have been introduced into waters not previously inhabited by them. Over-fishing in American waters has rendered the industry less profitable than it was, and the output varies considerably from year to year. In 1897 it amounted to 1,086,650 cases.

**Saloni'ca** (ancient, *Thessalonica*; Turkish, *Saloniki*), a large seaport of Turkey in Europe, on a gulf of the Aegean Sea, 315 mi. w.s.w. of Constantinople, rising from the sea in the form of an amphitheater, and forming a mixture of squalor and splendor. In Salonica may still be seen vestiges of Cyclopean and Hellenic walls, triumphal arches, and remains of Roman temples, Byzantine structures, and Venetian castles. Its harbor is excellent, and its roadstead well sheltered, and, next to Constantinople, it is the most important city of European Turkey. The principal exports are cotton, corn, tobacco, timber, and wool; imports, sugar, coffee, indigo, calicoes, etc. The manufactures include cotton, silk, leather, carpets, etc. Pop. about 74,500.

**Salsette'**, a large island to the north of Bombay, and connected with Bombay island by bridge and causeway; area 241 sq. mi. The staple crop is rice, and most of the uplands are reserved for grass for the Bombay market. The coast abounds in cocoanut groves, and the palmyra palm grows plentifully over most of the island. The island is remarkable for its cave architecture. Pop. 108,149.

**Salt**, in chemistry. It is impossible to state in very precise terms what is the idea attached to the word salt, as at present used in chemical science. The name is, however, most commonly and most appropriately applied to those bodies of which reaction by double decomposition is the most characteristic property, and which exhibit such reactions under the most familiar conditions.

**Salt**, Common (chloride of sodium), a substance in common use as a seasoner and preserver of food from the earliest ages. It exists in immense quantities dissolved in sea water, and also in the waters of salt springs, and in solid deposits, sometimes on the surface, sometimes at greater or less depths, in almost every geological series. It is found in abundance in nearly every country of Europe. The supply in other countries is equally great. The basin of the Indus and other parts of India possess

## Salta

extensive salt plains. In China deep salt wells abound. The Sahara and Central and Southern Africa afford inexhaustible supplies. Most of the South American Republics, the West Indies, and the U. S. also have large natural supplies. Salt manufactured from sea water is produced extensively along the Mediterranean and Atlantic seaboard of Europe as well as in America. It is chiefly made by natural drying in shallow reservoirs, but also by boiling. Sun-dried salt is the purest. Salt from sea water is usually known as *bay salt*. Most salt, however, is produced from rock salt or from brine springs, the latter being due to the melting of rock salt by water. The salt mines of Wieliczka in Galicia were worked in the twelfth century, and are the most celebrated in the world. The salt production of the U. S. in 1902 was about 3,338,890 tons. The most important salt-yielding state is Michigan, whose deposits are of remarkable richness. The wells, which are in the vicinity of Saginaw Bay, seem inexhaustible in supply. Some are over 1,900 ft. in depth. Their yield in 1901 was nearly 1,100,000 tons. In the valley of the Mississippi salt springs and wells are numerous. In Louisiana, on an island near New Iberia, is an immense deposit of rock salt of unusual purity; the area of the mass is 144 acres, and the quantity of salt it contains is estimated at 28,600,000 tons. On Virgin River, Nevada, there is a bed of rock salt, extending as a bluff along the river, for over 25 mi.; more than 60 per cent. of the cliff is salt of great purity. California has abundant salt springs and saline marshes. Salt is used as a glaze for coarse pottery, as a mordant, for giving hardness to soaps, for improving the clearness of glass; it is the source of soda and of chlorine, and is thus of immense industrial importance.

*Smelling salts* are a preparation of carbonate of ammonia with some of the sweet-scented volatile oils, used as a restorative by persons suffering from faintness. The pungency of the ammonia is all that is useful, and the oils are added to make it more agreeable. Oils of lavender, lemon, cloves, and bergamot are those chiefly used. The celebrated Preston smelling salts are scented with oils of cloves and pimento. The manufacture of ornamental bottles for this preparation is an important branch of the glass and silversmith's trades.

**Salta**, a province and town of the Argentine Republic. The province, which is the frontier one to the north, consists of ramifications of the Andes, fertile valleys, and wooded or pasture lands; area 45,000 sq. mi. The chief rivers are the Vermejo and Salado. Pop. 200,000. The town is about 800 mi. n.w. of Buenos Ayres. Pop. 20,000.

**Saltillo** (sál-til'yō), a town of Mexico, department of Coahuila, on the Tigre, a well-built town, with extensive manufactures of woolen blankets and serapes or ponchos. Pop. 26,000.

**Salt Lake City**, Salt Lake co., Utah, the state capital. Railroads: Union Pacific; R. G. & W.; S. L. & Ft. D.; and Utah Central. It is the seat of the University of Utah and the Mormon Tabernacle. It is the center of a

## Salvation Army

farming district, fertilized by irrigation. Mines are found in the vicinity. Industries include planing, paper, woolen, and flouring mills, tanneries, breweries, machine shops, foundries and smelting works, etc. The municipal government is now in control of the Gentiles or non-Mormons. Pop. 1900, 53,531.

**Salvador'**, a republic in Central America, lies along the coast of the Pacific, and is bounded by Honduras on the n. and e., and by Guatemala on the n.w.; area 7,212 sq. mi. A range of volcanic peaks, varying in height from 4,000 to 9,000 ft., runs through the center of the country, dividing an interior valley from the lowlands on the coast. The largest river is the Lempe, which is only navigable in parts. The soil is remarkably fertile. The most important crop is indigo, which is of excellent quality. Maize, sugar, coffee, tobacco, cotton, etc., also thrive well. Cattle breeding is carried on, but not extensively. The manufactures are unimportant. The chief exports are coffee, indigo, silver, raw sugar, balsam of Peru, leather, etc. They are of the annual value of about \$7,500,000. The population consists of a small number of whites (of Spanish descent), Spanish-speaking Indians, and half-breeds. The established religion is Roman Catholicism. The government is carried on by a president and four ministers. There is a congress of seventy deputies elected by universal suffrage. The inhabitants had long the reputation of being the most industrious in Central America. In proportion to its size it is the most densely peopled state. Population 1901, 1,006,848. Salvador remained under Spanish rule until 1821, when it asserted its independence, and joined the Mexican Confederation. In 1823, however, it seceded from the Confederation, and subsequently formed part of the Republic of Central America. In 1853 it became an independent republic. Its progress has been much hindered by internal dissensions, revolutions and counter-revolutions following each other without end. The capital is San Salvador.

**Salvation Army**, a religious organization originated in East London by William Booth, the leader and general, in 1865. The society was developed into its present form and received its name in 1876. With the name *army* came military phraseology. Prayer was called *knee-drill*; the leader a *general*; evangelists, *officers* (of different grades); and candidates, *cadets*. A semi-military attire was assumed, barracks were built, and the army marches out with banners displayed and bands of music. Music (drums, cornets, etc.) is also employed in the meetings, and other proceedings of a sensational character. The object is to attract people who would not enter church or chapel, and for this cause public houses, prisons, etc., are visited, and open air meetings are held. The weekly journal of the army is the *War Cry*. The army now carries on operations in most countries of the world, and has a revenue exceeding \$3,950,000 per annum. A branch of the Salvation Army in America is known as the American Volunteers. See *Volunteers, American*.



## Salvini

**Salvini**, TOMMASO (1830-96), tragedian, was b. at Milan, his father and mother both being actors. The boy, who showed early aptitude, was trained under Modena, a distinguished player, and became well known as a member of Ristori's company. In 1849 he fought with distinction in the revolutionary war; returning to the stage, played with eminent success as *Edipus* in a play written for Salvini by Nicolini, and as *Saul* in Alfieri's drama. In Paris he played in these, in Racine's plays, and as Shakespeare's *Othello*—the part with which he is identified in the minds of English playgoers. He scored successes in Brussels and Madrid, and visited the U. S. in 1874, England in 1875, with as great *éclat*. But after another visit to the U. S. in 1881, and to Britain in 1884, he retired from the stage to enjoy a life of learned leisure in his villa near Florence. Among his most striking parts were, besides *Othello*, *Hamlet*, *Macbeth*, and *Lear*. His son Alexander adopted his father's career, and inherited much of his talent.

**Salwin'** (Salween' or Salwen), a river of Burmah, with a general north and south course, parallel to the Irrawaddy, rising in North-western China, and falling into the Indian Ocean (Gulf of Martaban), the towns of Martaban, Moulmein, and Amherst being at or near its mouth. The river course is interrupted by rocks and rapids, but vessels of the largest size can reach Moulmein. Vast quantities of teak are annually floated down the Salwin and shipped at Moulmein for export. The area of the Salwin basin is 62,700 sq. mi.; the river is 800 mi. in length, and from 1 to 4 mi. in breadth.

**Salzburg** (sálts'búrh), a city of Austria, capital of the duchy (or province) of Salzburg, is almost picturesquely situated on both banks of the rapid Salza, which is here hemmed in between two isolated hills, 63 mi. s.e. of Munich. The principal edifices are the cathedral (1614-28), built in imitation of St. Peter's, Rome, the archbishop's palace (now belonging to the town), imperial palace, exchange, museum, and several benevolent institutions. It was the birthplace of Mozart, and there is a bronze statue of the composer by Schwanthaler. The manufactures are varied, but not individually of importance. The bishops of Salzburg were princes of the German Empire, and held the position of sovereigns over the archbishopric till it was secularized in 1802. Pop. 27,741. The duchy or crown land of Salzburg, area 2,767 sq. mi., is a rugged, mountainous country, intersected by numerous valleys, chiefly pastoral, but in many of them much corn and fruit are raised. Wood is abundant, and the minerals, which are very valuable, include gold, silver, lead, copper, cobalt, iron, salt, and marble. Pop. 173,510.

**Samar'**, one of the Philippine isles, separated by channels from Luzon on the north, and Leyte on the south. Area 5,000 sq. mi. The island is densely wooded and the soil fertile. The chief products are rice, cocoa, palm oil, hemp, and timber. Pop. 194,027.

## Samnites

**Sama'ra**, a town of Russia, capital of the government of same name, 550 mi. e.s.e. of Moscow, at the confluence of the Samara with the Volga. It has manufactures of leather and soap, and is now one of the most important commercial centers on the Volga, carrying on a large trade in corn, meal, salt, linen, wool, fish, and cavfars. Three markets are held annually. Pop. 95,302. The government lies on the left bank of the Volga, and has an area of 58,321 sq. mi. Wheat and other kinds of grain are the chief products. There are a considerable number of Swiss and German colonists here, also Nogai Tartars, Bashkirs, and Kirghis. Pop. 2,614,405.

**Samarang'**, town of Java, on the north coast of the island, near the mouth of the Samarang River. Next to Batavia and Surabaya it ranks as the most important commercial port of Java. Its harbor is not good, and large snips have to anchor at some distance from the shore. Pop. 65,815.

**Samaritans**, a mixed people, who inhabited the region between Judea and Galilee, and who formed a sect among the Jews. They consisted partly of the tribes of Ephraim and Manasseh left in Samaria by the king of Assyria when he had carried their brethren away captive, and partly of Assyrian colonists. On the return of the Jews from captivity they declined to mix with the Samaritans, though united with them in religion. The latter attempted to prevent the Jews from building the temple at Jerusalem, and, failing in this, they built a temple on Mount Gerizim exclusively for their own worship. A few of the race still exist scattered in Egypt, at Damascus, and at Gaza. They adhere strictly to the Mosaic law, but are regarded by the Jews as heretics, as they accept only the Pentateuch, of which they have a special version of their own.

**Samarkand'**, a city of Asiatic Russia, on the Zerafshan River, 130 mi. e. of Bokhara, situated in a fertile plain. It was once the capital of a powerful Asiatic kingdom, and subsequently of Tamerlane's empire. Samarkand was ceded to Russia in 1868. Pop. 36,000.

**Sambre** (sän-br), a river of northeastern France and Belgium, a tributary of the Meuse, which it enters at Namur; length 110 mi. great part of which is useful for navigation.

**Samnites** (-nítz), an ancient people of Lower Italy, who were of Sabine stock, and consisted of several tribes. They were a brave, frugal, and religious people. Their first war with the Romans resulted in favor of the latter, and secured a Samnite alliance during the Latin war (340-338 B.C.). The second Samnite War (326-304 B.C.) was a fierce contest, in which the Romans were shamefully defeated at the Caudine Forks, but were finally successful. The third Samnite War (298-290 B.C.) saw the overthrow of the Samnites and Gauls at Sentinum. When the Italian allies of Rome revolted against her in 90 B.C. the Samnites once again rose against their oppressors, but were subdued and almost extirpated by Sulla.

## Samoa Islands

**Samoa Islands.**—This is a group of volcanic islands in the South Pacific, northeast of the Fiji group, made up of three large islands, Upolu, Savaii, and Tutuila, and a number of smaller ones; total area about 1,700 sq. mi., with a population of nearly 37,000. The most important island of the group is Upolu, with an area of 340 sq. mi., diversified by mountains and fertile plains; pop. about 17,000. Apia is the largest town and has about 1,500 inhabitants, situated on a bay on the north-west side of Upolu. Savaii, the largest of the group, has an area of 659 sq. mi. and is extremely mountainous (greatest height, 5,350 ft.), the interior being hardly known. The Samoans are of Malaysian extraction, and vary in color from a dark brown to a light copper. They are of fine physique. The leading industries are fishing, collecting copra, the cultivation of fruit, cotton, and *taro*, and the manufacture of *tapa*, a native cloth.

By the terms of a treaty signed by Great Britain and Germany in November, 1899, and ratified by the United States in January, 1900, these islands are divided up between the United States and Germany. The latter secured Savaii and Upolu, the largest of the group, and the United States secured the Island of Tutuila and all the other islands of the group east of 171 degrees longitude west of Greenwich.

For many years American influence had been strong in Samoa. In 1872 the harbor of Pago Pago, which penetrates the south coast of the island of Tutuila like a fjord, and is the only good harbor in the whole group of islands, had been ceded to the United States for a naval and coaling station. In 1878 this cession was confirmed, and rights of freedom and extra-territorial jurisdiction in Samoa were granted.

The native government of the islands had always been under the two royal houses of Malietoa and Tupea, except on the island of Tutuila, which was governed by native chiefs. In 1873 foreign residents suggested that a house of nobles and a house of representatives be established. This plan was carried out, and Malietoa Lupepa and the head of the house of Tupea ruled as joint kings. Subsequently Malietoa became sole king, but in 1887 he was deposed by the German government upon the claim of unjust treatment of German subjects living in the islands. Malietoa was deported and the Germans proclaimed as king, Tamasese, a native chief. The British and American consuls protested, and Mataafa, of the house of Malietoa, overthrew Tamasese and became king. With prospect of trouble in that quarter, representatives of the United States, Great Britain and Germany held a conference in Berlin in 1889, which resulted in a treaty recognizing the Samoan islands as neutral territory with an independent government, the natives being allowed to follow their own laws and customs, while for civil and criminal causes in which foreigners were interested, there was established a Supreme Court of Justice, in which an Ameri-

## Samoa Islands

can citizen was the presiding judge. This arrangement continued until 1898, when disturbances regarding the right of succession to the throne arose.

The contestants were Mataafa and Malietoa Tanus, the former receiving six times as many votes as the latter. But his right to the throne was denied, and his opponent brought his case to the supreme court. The Berlin treaty of 1889 provided that "In case any question shall hereafter arise in Samoa respecting the rightful election or appointment of king, or any other chief claiming authority over the islands, or respecting the validity of the powers which the king or any other chief may claim in the exercise of this office, such question shall not lead to war, but shall be presented for decision to the chief justice of Samoa, who shall decide it in writing, conformably to the provisions of the act, and to the laws and customs of Samoa not in conflict therewith; and the signatory governments will accept and abide by such decision."

After due trial it was decided on the last day of 1898 that Malietoa Tanus was the rightful and legal king of Samoa. After the decision was rendered the American, British, and German consuls met with the officers of the British and German warships in the harbor. The American and British consuls accepted the decision of the court and prepared at once to crown the newly elected king. The German consul protested vigorously, and declared himself in favor of Mataafa, who had collected about 3,000 followers to uphold his claim. Hostilities were begun at once, and as Malietoa Tanus had only about 1,200 followers, he was easily defeated. The chief justice was threatened by the followers of Mataafa, and he and the king took refuge on the British warship. On the 5th of January, 1899, the consuls recognized the Mataafa government pending instructions from the treaty powers. A German named Dr. Raffel, president of the municipal council, was appointed as the head of the provisional government. He immediately issued an order closing the supreme court, an act which the American and British consuls declared to be a usurpation of power. In spite of Dr. Raffel's claim that his power superseded the supreme court, Captain Sturdee, of the British war vessel *Porpoise*, decided to open the supreme court under guard of a force of marines. This was done, and the American and British flags were raised over the building. The Germans were much incensed by this act; one of them stoned the doors and windows of the building.

Soon after this the American and British consuls protested to the German consul against the action of Dr. Raffel, and refused to have any further official intercourse with either unless an apology was made for their action towards the chief justice. At this juncture the German government notified its consul that his protest against the supreme court was not sustained. This had the effect of restoring peace in the islands until March, 1899.

On the 8th of March, the U. S. flagship



#### EUROPEAN RULERS

Oscar II,  
King of Norway and Sweden  
Wilhelmina,  
Queen of the Netherlands

Plate 31, Vol. IV

Abdul Hamid II,  
Sultan of Turkey  
Victor Emanuel III,  
King of Italy



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## Samoa Islands

*Philadelphia*, with Admiral Kautz, arrived at Apia, and after a meeting of the consuls and officers of the American, British, and German war vessels, the American admiral issued a proclamation stating that the decision of the supreme court must be upheld, that the Mataafa government had no legal status and was ordered disbanded. Protection was guaranteed to all who accepted the terms of the proclamation.

The following day the German consul issued a counter proclamation, stating that the proclamation of Admiral Kautz was false, and that the German consul still recognized the Mataafa government.

This proclamation had the effect of stirring the natives to open revolt, and the American consulate was attacked. The American and British war vessels opened fire upon the villages and much property was destroyed. On the 13th of March Dr. Raffel was superseded by Dr. W. Solf as president of the municipal council, a change that restored quiet almost instantly.

Malietao was crowned king on the 23d of March, but the Germans were not present at the ceremonies. The followers of Mataafa paid no attention to a proclamation issued by the American and British consuls, to the effect that if they would lay down their arms, they would no longer be considered rebels, and the war continued. Early in April a number of American and British sailors landed, and were attacked by Samoans in ambush, and several officers and men were killed. Fighting continued throughout the month of April, mostly to the advantage of the Samoans.

It became evident that the plan evolved by the treaty of 1889 for the government of the islands was not practical, and the three powers each appointed one representative to settle all the questions in dispute regarding the Samoan islands. Hon. Bartlett Tripp of South Dakota, ex-American minister to Austria-Hungary, was the American member of the commission. Great Britain appointed C. N. E. Elliott of the British embassy at Washington, and Germany named Baron Speck von Sternberg of the German embassy at Washington.

This commission arrived at Apia, May 13, 1899, and three days later assumed control of affairs. They did not recognize either claimant to the crown, but demanded that each party disband and restore peace. The supreme court was sustained, and after an investigation of the facts, Malietao was declared the rightful king. He abdicated soon after that.

The visit of the commission did not restore peace as might have been expected, but the strife between the factions continued.

The commission, after some weeks of investigation, succeeded in framing a treaty which all the members signed. This treaty, together with the report of the commission, was transmitted to the respective governments for ratification. The report of the commission went into the details of the evils existing under the conditions imposed by the Berlin

## Samoa Islands

treaty of 1880, and the treaty, which sought to do away with these evils, in brief, provided for the appointment of an administrator from some disinterested power, to possess a large measure of authority. The three powers interested were to appoint three delegates to assist the administration, exercise such consular duties as were necessary, and form with the administrator a legislative council. The consular jurisdiction, which had proved so disastrous to the peace of the islands, was to be abolished.

The commission stated that this arrangement was only tentative, but thought that although it was not ideal, it would prove to be satisfactory to a degree.

After due consideration of the commission's report, and the proposed treaty, it was acknowledged by three governments that the tripartite rule in Samoa was a failure, and in October, 1899, it was announced that negotiations were going on for a partition of the islands between the United States, Great Britain and Germany.

It then became a question of the right partition of the islands. There was not much to be divided, and it was recognized early that the United States, by reason of the long-standing relations with the chiefs of the island of Tutuila, had prior claims which must be allowed. As there was so little left to divide, it was agreed between Germany and Great Britain that the latter should withdraw entirely from the islands, and with the consent of the United States, Germany was to have the islands of Savaii and Upolo and the small adjacent islands, and the United States was to have the island of Tutuila and some subsidiary islands.

By an agreement between Great Britain and Germany, the latter, in return for British concessions in the Samoan Islands, surrendered all her claims to the Tonga or Friendly islands and Savage islands, also the Solomon group, to Great Britain. Some minor concessions in Zanzibar and Western Africa and in the Gold Coast region were also made by Germany.

The treaty regarding the partition of the Samoan islands was signed Dec. 2, 1899, and was ratified by the U. S. senate Jan. 16, 1900. By its provisions the Samoan Act of Berlin, dated June 14, 1889, and all previous treaties, conventions, and agreements relating to Samoa were annulled.

Germany and Great Britain each separately "renounces in favor of the United States of America all her rights and claims over and in respect to the island of Tutuila and all other islands of the Samoan group east of longitude 171 degrees west of Greenwich. Reciprocally the United States of America renounce in favor of Germany all their rights and claims over and in respect to the islands of Upolo and Savaii, and all other islands of the Samoan group west of longitude 171 degrees west of Greenwich.

"It is understood and agreed that the three signatory powers shall continue to enjoy, in

## Samos

respect to their commerce and commercial vessels in all the islands of the Samoan group, privileges equal to those enjoyed by the sovereign power in all ports which may be open to the commerce of either of them.

"The present convention shall be ratified as soon as possible, and shall come into force immediately after the exchange of ratifications."

It was provided in a separate convention, signed at Washington, Nov. 7, 1899, that all claims of Samoan residents for damages were to be submitted to the arbitration of King Oscar of Sweden. This treaty was ratified March 7, 1900. King Oscar later agreed to act as arbitrator. His decision was announced Oct. 22, 1902, as in favor of Germany on all the points at issue. Reserved to "a future decision" is the question "as to the extent to which the two governments, or each of them, may be considered responsible for the losses." The two nations which are the losing parties in this award cannot be said to accept it as in accord with the facts. Germany looks upon it as a justification of the attitude of her representatives in Samoa, in 1899, toward American and English intervention.

The island of Tutuila is the smallest of the three larger islands of the group. It has an area of about 54 sq. mi., with a population of 3,800. Manua, lying to the east of Tutuila, and other islets have a united area of about twenty-five sq. mi. Tutuila is mountainous, luxuriously wooded, and fertile. It is described as the most pleasing of the Samoan islands.

Savaii has a length of about 47 miles, and its greatest breadth is 28 miles. Upolo has about the same length, but it is much narrower. Both islands are mountainous, fertile, and well-watered. The chief port of the whole group, Apia, is in Upolo. The inhabitants of the islands are Polynesians.

The chief value of these islands lies not in their direct commercial value, but in their advantageous location. They lie in almost direct line between San Francisco and Australia, and slightly south of the direct steamship line connecting the Philippines with the proposed Panama and Nicaraguan canals.

**Samos** (now Samo), an island in the Grecian Archipelago near the coast of Asia Minor, 45 mi. s.w. of Smyrna, forming a principality tributary to Turkey; area 180 sq. mi.

The United States established a coaling station at Pago-Pago, and improved the harbor. To prevent further trouble among the natives all the arms and ammunition were required to be deposited with the authorities. A force of natives were appointed for police service and native governors were also installed. As there was no system of taxation in force these officers were serving without pay. A petition was presented to Commander B. F. Tilley, governor of the islands belonging to the United States, asking that a law for taxing the natives be enacted. As there was no school system in the islands the only educational work was in the hands of missionaries. The people have asked for free public schools.

## San Cristobal

**Sampson, W. T.**, Rear-Admiral, was born at Palmyra, New York, in 1840. At the age of 17 he was appointed a midshipman in the U. S. Naval Academy at Annapolis. He graduated at the head of his class in 1861 and was immediately ushered into service. He soon gained a lieutenantancy, and in 1866 was promoted to lieutenant-commander while on the *Colorado*. From 1868 to 1871 he was at the naval academy and again from 1876 to 1879. From 1893 to 1897 he was chief of the bureau of ordnance. He was president of the *Maine* court of inquiry in March, 1898, and in April he was promoted to acting rear-admiral and took command of the fleet operating in Cuban waters. He commanded the fleet off Santiago until the city surrendered. He died in Washington May 6, 1902. Pl. 14, Vol. II.

**Samsö** (säm'seu), a small island belonging to Denmark, situated in the Kattegat, between Zealand and Jutland. The soil is very fertile. The chief place is the large village of Nordby.

**Samson**, an Israelite of the tribe of Dan, the son of Manoah, reckoned one of the judges of Israel, a popular hero, and an inveterate enemy of the Philistines, flourished about 1116-1096 B. C. His peculiar gift of great bodily strength is strikingly shown in the nature of his deeds, as tearing in pieces a lion, breaking his bonds asunder, and carrying away the gates of Gaza. Delilah, his concubine, deprived him of his strength for a period by cutting off his hair, which was a violation of his obligation as a Nazarite, but with the growth of his hair his strength returned, and at the great festival of Dagon Samson pulled down the building over the heads of the Philistines, who had blinded him, he himself perishing with them. Milton has made his death the subject of a drama—*Samson Agonistes*.

**Samuel**, the first of the order of prophets and the last of the judges of Israel. He was the son of Elkanah of Ramathaimzophim, belonging to the tribe of Levi, and was consecrated by Hannah, his mother, to the service of Jehovah. He assumed the judgeship of Israel about twenty years after the death of Eli, and headed a successful expedition against the Philistines. His administration was distinguished by the restoration of the neglected worship of Jehovah. In his old age Samuel anointed Saul as king, and when Saul failed in his duties Samuel anointed a new king, David. He did not live to see the contest between David and Saul decided.

**San Antonio**, Bexar co., Tex., 81 mi. s.w. of Austin. Railroads: Southern Pacific; International & Great Northern; San Antonio & Ark. Pass. Center of an agricultural and cattle raising district; exports wool, hides, and live stock. Pop. 1900, 53,321.

**San Bernardino**, county seat of San Bernardino County, Cal., 60 mi. e. of Los Angeles, on the Southern California Railway. Surrounding country given to fruit growing and mining. The railroad shops are the most important industry. Pop. 1900, 6,150.

**San Cristo'bal**, town of Mexico, capital of the state of Chiapas, 450 mi. e.s.e. of the city



## Sand

of Mexico. Manufactures earthenware and coarse textiles, but the chief occupation is cattle-raising. Pop. est. 1897, 12,000.

**Sand**, fine particles of stone, particularly of siliceous stone in a loose state, but not reduced to powder or dust; a collection of siliceous granules not coherent when wet. Most of the sands which we observe are the ruins of disintegrated rocks, and differ in color according to the rocks from which they were derived. Valuable metallic ores, as those of gold, platinum, tin, copper, iron, titanium, often occur in the form of sand or mixed with that substance. Pure siliceous sands are very valuable for the manufacture of glass, for making mortar, filters, ameliorating dense clay soils, for making molds in founding, and many other purposes.

**Sand**, GEORGE. See *Dudevant*.

**Sandal-Wood**, a tree belonging to the East Indies, and the Malayan and Polynesian islands, remarkable for its fragrance. Its wood is used as a perfume, and is manufactured into glove-boxes and other light articles. It is largely used as incense in the worship of Brahmans and Buddhists. There are several species which furnish sandal-wood, the common being *S. album*. Some trees of other genera are called false sandal-wood.

**Sandal-wood Island** (or Jeendana), a large island in the Indian Archipelago, belonging to the Dutch residency of Timor, crossed by the meridian of 120° E.; area 4,966 sq. mi.; with a population of about 1,000,000. The coast is bold, and terminates at the southern extremity in a lofty and inaccessible peninsula. The interior is mountainous. Edible birds' nests, beeswax, and sandal wood are obtained here. The natives are described as treacherous and ferocious.

**Sandarach** (san'da-rak), a resin which exudes from the bark of the sandarach tree, which grows in Barbary. It is used for incense and for making a pale varnish. It is also used as a pounce powder for strewing over paper erasures. Called also *Juniper resin*.

**Sanday**, one of the Orkneys, an island of very irregular shape, generally with a very flat surface and a light, sandy soil; greatest length fully 13 mi. There are a number of small lakes. Pop. 2,082.

**Sand Blast**, a method of engraving and cutting glass and other hard materials by the percussive force of particles of sand driven by a steam or air blast, invented by B. C. Tilghman, of Philadelphia.

**Sand Eel**, a genus of fishes. The body is slender and cylindrical, somewhat resembling that of an eel, and varying from 4 in. to about 1 ft. in length, of a beautiful, silvery luster, destitute of ventral fins, and the scales hardly perceptible. The sand eel of America is found from the coast of Labrador to that of New York. It is largely used in the provinces as a bait for cod.

**Sanderling**, a wading bird averaging from 6 to 8 in. in length, which breeds in the Arctic regions, and in winter migrates southward. It feeds on small marine animals, and chiefly

## Sandpipers

inhabits the sandy tracts of the sea beach and the estuaries of rivers. The flesh is nutritious and pleasant to the taste.

**Sand Grouse**, a genus of rasorial or scratching birds, differing in several respects from the common grouse. They are natives chiefly of the warm parts of Asia and Africa, and are most abundant in arid sandy plains. The legs are longer than in other grouse, and the tail and wings are pointed. Pallas's sand grouse differs from these in having feathered tarsi and united toes. It is a native of the sandy plains of Central Asia, where it occurs in vast numbers. Much interest was excited in 1863, and again in 1888, by vast flocks of these birds invading Europe. They crossed the North Sea, and were found in considerable numbers throughout Britain and the Faroe Isles, and even bred in Britain in one or two cases.

**Sandhurst**, a flourishing city of Victoria, Australia, about 100 mi. n.n.w. of Melbourne, with which it has railway communication. It is the center of a rich auriferous country. Besides gold mining, in which between 4,000 and 5,000 miners are employed, the most important industries are iron founding, coach building, tanning, and in addition farming and vine growing.

**San Diego**, San Diego co., Cal., on the Pacific Coast. Railroads: Santa Fé; N. C. & O.; S. D. C. & E.; S. O. O. T. & B. B.; and Coronado. Industries: brewery, flouring mill, two iron foundries, three ice, twelve cigar, mattress, broom, flavoring extract, citric acid, mineral water, and other factories. Surrounding country agricultural and mineral. The town was first settled in 1540, and became a city in 1880. Pop. 1900, 17,700.

**San Domingo** (more properly, Santo Domingo), the capital city of the Dominican Republic, which includes the eastern part of the island of Hayti. The town is situated at the mouth of the Ozama on the south coast, and is the seat of the government and a bishop's see. It has spacious streets and squares, a cathedral dating from 1540, a university, etc. San Domingo is the oldest European city of the New World, and was founded by Bartholomew Columbus in 1496. Columbus was buried here in 1536; but his remains were removed to Havana in 1794. Pop. about 25,000.

**Sandpipers**, a group of small wading birds, belonging to the family of snipes. These birds inhabit the shores of the sea and the estuaries and banks of rivers, and grope in the soft mud for the worms, small mollusks, insects, etc., upon which they feed. They migrate southward in winter in flocks, and appear to molt twice a year, the summer plumage differing from the winter dress. The voice is shrill and unmusical; and they are able both to run and to fly with rapidity. They are found in all parts of the world. The purple sand piper among the American species is found on the shores of eastern North America and in Europe. It is frequently called the rock snipe.

**Sandstones** consist usually of grains of quartz aggregated into a compact rock, which may also contain particles of feldspar, minute

## Sandusky

scales of mica, and an admixture of clay, indicating in many places their immediate derivation from the debris of granitic rocks. Sandstones are in most cases chiefly composed of particles of quartz, united by a cement. The grains of quartz are sometimes scarcely distinguishable by the naked eye, and sometimes are equal in size to a nut or an egg, as in those sandstones called conglomerates, or sometimes pudding-stone or breccia. In color sandstone varies from gray to reddish brown, in some cases uniform, in others variegated.

**Sandusky**, county seat of Erie co., O.; port of entry on Sandusky bay, at the mouth of the Sandusky river; 3 m. from Lake Erie and 61 m. w. of Cleveland; on the B. & O., the Clev., Cinn., Chi. & St. L., the Columbus, Sandusky & Hocking, the Lake Erie & Western and the L. S. & M. S. railroads. Steamboats connect Sandusky with Cleveland, Detroit, Toledo, the islands in Lake Erie and also with Canadian ports, to which it sends large quantities of caviare, smoked sturgeon, isinglass and fish oil. It has large receipts of coal by rail, and of iron ore, lumber and fish by water. The city is the center of a grape and peach growing district and is noted for its wine production and for its extensive shipment of fruits. The fresh fish industry is also important and is promoted by a large U. S. hatchery at Put-in-Bay. The most important manufactures are spokes, hubs, carpenter's tools, engines, boilers, cement, threshing machines, wine casks and fruit packages. Sandusky has a U. S. government building and a fine public library and is the seat of the Ohio Soldiers' and Sailors' Home. Pop. 1900, 19,636.

**Sandwich Islands.**—See *Hawaii*.

**San Francisco**, San Francisco co., Cal., on west shore of San Francisco Bay, 7 mi. from the ocean. Railroads: Southern Pacific; Central Pacific; S. F. & S. P., and two others. Has ocean steamship lines to Japan, China, Mexico, Sandwich Islands, South America, and Australia. It is the commercial metropolis of California with a large foreign and domestic commerce. Industries include fisheries, and whaling interests, sugar, cigar, boot and shoe factories, breweries, flouring mills, clothing, canned fruit, sash, door, and blind works, foundries, machine shops, wire cable works, woolen mills, extensive iron shipbuilding works, etc. It is the seat of a branch U. S. mint and has many handsome buildings and public institutions. The Spaniards first permanently occupied San Francisco in 1776, where they established a military post, while at the same time some Franciscan monks established a mission there. In 1835 a village, called Yerba Buena, was established on the site of the present city, and in 1846 the U. S. naval authorities took possession of the region, and in 1847 the present name was given to the city. The gold mines discovered in 1848 attracted the greater part of the population from the city but they soon returned to their business interests. The city was built so rapidly, and the houses of such poor material, that it was constantly menaced by fires,

## Sanitary Science

which in fact, between 1849 and 1851 desolated the city, destroying \$16,000,000 worth of property. These disasters proved beneficial in the end, for the city was reconstructed on a more substantial foundation. The peace of the city was again menaced in 1851 by the lawlessness of the bands of adventurers who were attracted by prospects of easy money-making. Their acts led to the organization of vigilance committees who ruled the city with an iron hand for many days. In 1861 the city suffered from a panic caused by injudicious speculations. Confidence was restored and the city remained quiet until 1877, when it was agitated by Dennis Kearney and his communistic agitation. He was put down and quiet restored. Notwithstanding its many reverses it has continued to grow until now it is the most important city on the Pacific Coast. Population, 1900, 342,782.

**Sanitary Science** teaches how to maintain health and to ward off disease, and treats more especially of what is required of each individual in his duty to his neighbor, so that by using such means as may insure his own health he may in a negative way preserve that of his neighbor also. The subject naturally divides itself into four main divisions: 1, That relating to our dwellings; 2, Food; 3, Clothing; 4, Cleanliness. As regards the first head, our dwellings should be situated so as to insure a free circulation of air round them, and a thorough system of drainage. The rooms should be large, airy, and well ventilated. A most pernicious source of impurity is sewer gas, which can only enter houses where waste and soil pipes are in direct communication with the main system of sewers. The decomposition of fecal and other matters in drains produces both ammoniacal and other sulphurous gases. These gases, owing to their light specific gravity, rise to the highest point in the pipes and from thence force their way through imperfections in drains and pipes, and also through the water traps of closets, sinks, etc., into our houses, and become a most potent atmospheric impurity. They are of two kinds—an odoriferous and an odorless gas. The former is almost innocuous, but the latter is most deadly, since it depresses the general system and frequently contains the germs of disease. Sunlight and thorough ventilation destroy the properties of this gas. In order to prevent sewer gas from entering a house, all waste-pipes in connection with the sewers should be carried along outside the house and furnished with a ventilator, so that the gas may escape into the external air. The ventilator should discharge at the roof of the house, and not near to a window or other opening into the dwelling. The outlet of pipes from wash-basins in bedrooms should discharge in the open air, and should not be directly connected with drains. Foul smells and gases arise from many other causes, such as decomposition of organic matter within the house, emanations from the surface of the body, preparations of arsenic and copper in wall paper, etc. Flowers give off carbonic acid gas at night, and gas jets

## Sanjak

pour much impurity into the atmosphere. Overcrowding also greatly vitiates the atmosphere. Thorough drainage of our houses is also very necessary in order to prevent dampness, which is a most prolific source of disease. Every portion of a house should be kept scrupulously clean, and after infectious or contagious disease there should be a thorough cleansing and disinfecting of the furniture, bedding, carpets, etc. A few words require to be said on the last division of the subject—that of cleanliness. The neglect of an efficient use of cold water is perhaps one of the most potent and prolific causes of disease. The first duty of every human being is to attend thoroughly to the cleansing of the whole body, and this can only be done by the free application of water. The daily use of a cold bath is not only conducive to health, but a powerful preventive against disease. It is always desirable when we leave a bath that a glow—called the reaction—should be felt all over the body, and this can be assisted by the vigorous use of a rough towel. Bathing in this way is a powerful natural tonic to the skin, nerves, and muscular system. It promotes digestion, regulates the bowels, and is in fact invaluable as a sanitary measure. All under-clothing should be changed at least once a week; and socks and stockings every two days. All household furnishings should be kept thoroughly free from dirt. One or two other points should also be noticed. Exercise is one of these. It may be walking or horse exercise. Both are invigorating; both promote appetite and digestion and the healthy action of the functions generally. An outdoor occupation is to be preferred on the score of health. In addition, freedom from anxiety, cheerful society, honesty, and the practise of all the virtues are most conducive to the promotion and preservation of health.

**Sanjak** (Turkish, "a standard"), is a name given to a subdivision of an eyalet or minor province of Turkey, from the circumstance that the governor of such district is entitled to carry in war a standard of one horse tail.

**San Joaquin** (*hó-á-kén'*), a river of California which traverses the valley of the same name from the Tulare Lake, joins the Sacramento, and falls into Suisun Bay. Length 350 mi.

**San Jose**, Santa Clara co., Cal., 50 mi. s.e. of San Francisco. Railroads: Central Pacific; S. California. Seat of a state asylum for the insane, a state normal school, College of Notre Dame, etc. Industries include flouring, woolen, and planing mills, windmill factory, canneries, wineries, machine shops, foundries, etc. Pop. 1900, 21,500.

**San Juan**, the capital and largest city of Porto Rico, is situated on a small island on the north coast, connected with the mainland by a bridge. The harbor is the best in Porto Rico. The city is surrounded by a wall which was built 250 years ago. Since the occupation of the city by the U. S. the sanitary conditions have been much improved, and many new schools have been opened. The manufactures include matches, brooms and soap. Pop. (1899), 32,048.

## San Marino

**San Juan Boundary Question.**—By the Treaty of Washington (June 15, 1846) it was provided that the boundary line between the U. S. and Canada should be continued to the middle of the channel between Vancouver's Island and the continent, and thence south to the Pacific Ocean. But the island of San Juan lies in the middle of this channel, and the question immediately arose to whom the island should belong. It was a subject of long and bitter dispute, but at last the matter was submitted to the arbitration of the Emperor William of Germany without appeal. The emperor's award, dated Oct. 21, 1872, was given unreservedly in favor of the American claim, on the ground that the American view of the treaty of 1846 was the more correct one.

**Sankey**, IRA DAVID, an evangelist, b. in Edinburg, Pa., in 1840. He is chiefly known by his work in connection with Dwight L. Moody, whom he first met in Indianapolis in 1870. He had a fine baritone voice, and his singing was a great auxiliary to Moody's evangelical work.

**Sāṅkhya** is the name of the chief philosophical system of India. Its doctrines are attributed to the sage Kapila, fabled to have been a son of Brahma and an incarnation of Vishnu. It teaches the eternity of matter and spirit independent of a Supreme Being, and propounds a code of twenty-five principles, by the observance of which eternal happiness or complete exemption from every kind of ill can be obtained. Sāṅkhya philosophy is supposed to date from a period anterior to the eighth century B.C.

**San Lucar-de-Barrameda**, a seaport of Spain in Andalusia, at the mouth of the Guadalquivir, in a sandy, treeless district, 18 mi. north of Cadiz. There is a considerable trade, especially in wine. Magellan embarked here in 1519 on his first voyage. Pop. 22,777.

**San Luis**, a province of Argentine Republic. Area 23,359 sq. mi. The climate is healthy, and rain seldom falls. The province is rich in copper and other metals. The leading industry is cattle rearing. Pop. 100,000. The chief town is San Luis de la Punta. It consists chiefly of mud huts surrounded by mimosa thickets. A trade is done in cattle and hides. Pop. 7,000.

**San Luis de Potosi** (*pot-o-sé'*), a city of Mexico, capital of the state of same name, 198 mi. n.w. of Mexico, 6,350 ft. above sea level; regularly built, with fine streets. It has a handsome cathedral; manufactures of clothing, shoes, hats, etc.; railway work shops; and a considerable trade. Pop. 37,314. The state has an area of 27,593 sq. mi., is generally fertile, and has rich gold and silver mines. Pop. 546,447.

**San Marino**, the smallest independent republic in Europe, has an area of 33 square miles, lies between the provinces of Forlì and Pesaro-Urbino, and consists of part of the spurs of the Apennines. Monte Titano, the central and culminating point, has three peaks (M. Guaita, Cucco, and Gista), the three *Penne* of San Marino—a name evidently



## San Marino

identical with the Celtic Penn or Benn, but translated by the canting heraldry of the republic's coat of arms as three "feathers." The two streams (Marecchia and Ausa) which pass through Rimini to the sea have their head-waters partly in the north and west of San Marino, while its southeastern valleys are drained by the sources of the Marano. Farming and stock-raising occupy the bulk of the population, which in 1895 amounted to about 9,000, and their wines and oxen are both highly prized. The city of San Marino (about 1,800 inhabitants), formerly reached only by a mule track, but since 1875 by a good carriage road, is a quaint little place with narrow streets and picturesque but gloomy houses of undressed stone, and containing five churches, a council hall, an audience chamber, a law court, a little theater, a museum, and a library. In the center of the principal square stands a white marble statue of Liberty, presented by the duchess of Acquaviva. At the foot of the city hall lies the Borgo di San Marino (the commercial center of the republic), and other municipal villages are Serravalle, Faetano, and Montegiardino, each with remains of its castle and fortifications.

The republic is governed by a great council of 60 members (20 nobles, 20 burgesses, 20 rural land owners) named for life by the council itself. From this body is elected the Council of Twelve, which, with the assistance of a legal adviser, decides in the third and last resort. Two captains-regent, elected every six months (one from the nobles, one from the other two classes) represent the state, which also has its home secretary, its minister of foreign affairs, its chancellor of the exchequer, an army of 950 men, and a regular budget. By treaty with Italy (1872) San Marino, instead of maintaining a customs line of its own, receives a certain proportion of the Italian customs revenue, and, agreeing not to grow tobacco, is allowed to purchase foreign tobacco duty free. To avoid any difficulty about copyright there is no printing press in the republic.

San Marino derives its name from a certain Dalmatian mason who, along with a comrade immortalized by the neighboring castle and cathedral of San Leo, settled in this region in the third century. The bones of Marinus are said to have been removed to Pavia by the Lombard king, Astolphus, and restored to the little city on Mount Titano by Pippin; but the first authentic document proving the existence of the community dates from 885. Situated as a bulwark between the hostile houses of Montefeltro and Malatesta, San Marino fortunately attached itself to the stronger party, which in the fifteenth century placed its representative on the ducal throne of Urbino. The assistance which it rendered Duke Federigo and his allies, the king of Naples and the pope, against Sigismondo Malatesta was rewarded in 1463 with the castles and territories of Serravalle, Faetano, and Montegiardino. On the annexation of Urbino to the States of the Church (1631), the independence of San Marino was acknowledged;

## San Salvador

and the unauthorized assertion of papal jurisdiction by Alberoni in 1739 was disallowed by Clement XII. on February 5, 1740. In 1794 Napoleon I. decided to preserve the "échantillon de republique;" and in 1854 it was protected from the designs of Pius IX. by the interference of Napoleon III. At the unification of Italy, Cibrario, a citizen in the service of the house of Savoy, helped to secure excellent terms for San Marino.

**San Martín de José** (1778-1850), Chilean general, was born at Yapeyu, on the Uruguay river. In his eight or ninth year he accompanied his own family to Spain for his education, and being intended for the military profession was admitted into the college of nobles at Madrid. He saw active service and gained distinction in the war of independence, and had risen to the rank of lieutenant-colonel when, in 1811, he returned to La Plata. Entering the service of the insurgents there, he was entrusted with raising a troop of cavalry, and afterward was appointed to the chief command of the army acting in Upper Peru against the forces of the viceroy of Lima. After re-establishing his health at Cordova in 1814, he proceeded in 1815 to take command of Cuyo, where he organized an expedition for the liberation of Chili. He crossed the mountains early in 1817, and after gaining a brilliant victory at Chacabuco on February 12, was pressed by the people of Chili to take the supreme command, and gained a still more brilliant victory at Maipú, April 5, 1818. After organizing the government of Chili he sailed with a squadron under Lord Cochrane for Peru, August, 1820, and, capturing Lima, drove the Spaniards from the coast and assumed the title of "Protector" of Peru in 1821, but resigned it a year afterward, and sailing secretly for Europe, spent the remainder of his life in absolute seclusion near Paris. He died at Boulogne, August 17, 1850.

**Sanmichele, Michele** (1484-1559), one of the ablest architects of his time, studied under his father, Giovanni, and his uncle, Bartolomeo, who both practiced as architects at Verona with great success. Early in life he designed and carried out a very large number of works at Verona, Venice, and other places. He was also distinguished as a military architect, and was employed in strengthening the fortifications of Corfu, Cyprus and Candia. One of Sanmichele's most graceful designs is the Capella de' Peregrini in the church of S. Bernardino at Verona. He built a great number of fine palaces at Verona, five of which still exist, as well as the graceful Ponte Nuovo. He wrote a work on classic architecture, which was printed at Verona in 1735. His work is always refined and his detail delicate.

**San Miguel** (mi-gel'), a town of Mexico, state of Guanajuato, on the Rio de la Lara, with manufactures of woolens, saddles, weapons, etc. Pop. 10,000.

**San Salvador**, a town in Central America, capital of the state of Salvador, situated near the volcano of the same name. The inhabitants are chiefly engaged in agriculture. The

## San Sebastian

town was completely destroyed by earthquake on April 16, 1854, and has suffered severely since. It was founded originally in 1528. Pop. 20,000.

**San Sebastian**, a city and seaport in the northeast of Spain, capital of the province of Guipuzcoa. It was once strongly fortified, its fortifications including the castle of Mota on the summit of Orgullo, 493 ft. high. The manufactures consist chiefly of cordage, sail cloth, leather, candles, and soap. San Sebastian is of considerable antiquity, and having, by its early fortification, become the key of Spain on the side of France, figures much in all the wars between the two countries. Pop. 23,072.

**Sanskrit Language and Literature.**—Sanskrit is the name given to the learned and classical language of the Hindus, the language in which most of their vast literature is written, but which has not been a living and spoken language since about the second century before Christ. It is one of the Aryan or Indo-European family of tongues, and may be described as a sister of the Persian, Greek, Latin, Teutonic, Slavonic, and Celtic tongues. It stands in the same relation to the modern Aryan languages of India as Latin stands to the Romance languages. It is a highly inflected language, having in this respect many resemblances to Greek. To philologists it has proved perhaps the most valuable of tongues, and it was only after it became known to Europeans that philology began to assume the character of a science. Its supreme value is due to the transparency of its structure, and its freedom from the corrupting and disguising effect of phonetic change, and from obliteration of the original meaning of its vocables. The name Sanskrit means carefully constructed or symmetrically formed, and was given to distinguish it from the vernacular dialects, which were called *Prākṛit*, that is, common or natural. It is probable that Sanskrit, in its more highly elaborated form, was never spoken by any great body of the people. The alphabet is usually known as the *Nāgarī* or *Devanāgarī*, and in its earliest form dates back several centuries before Christ. It consists of fourteen vowels and diphthongs, and thirty-three consonants, besides one or two other characters. Among the phonetic peculiarities of Sanskrit may be mentioned the absence of *f* and the existence of consonants such as *kh*, *gh*, *th*, *dh*, in which the *h* is distinctly heard after the other sound. When several consonants come together they are fused into one compound character in which the original components are often hard to distinguish. In Sanskrit roots play a most important part, the processes of declension and conjugation being looked upon as consisting in the appending of certain terminations to root forms, or roots modified in certain ways to form inflective bases. The system of case terminations is similar to those in Latin and Greek, but in declensional forms Sanskrit is richer than either of those languages. There are eight cases—nominative, accusative, instrumental,

## Sanskrit Language and Literature

dative, ablative, genitive, locative, and vocative. There are three numbers—singular, dual, and plural—and three genders. The verb in Sanskrit exhibits many striking analogies to the verb in Greek, but it is not so rich in forms. Prepositions are scarcely used in Sanskrit to govern nouns, as in other Aryan languages, but as prefixes to verbs they are of constant occurrence. Syntax holds but an unimportant place in Sanskrit grammar. The excessive use of cumbrous compounds—some of them of extraordinary length and complexity—is a very general feature in Sanskrit, appearing in all styles of composition, but especially the more artificial.

Sanskrit literature covers a period extending from at least 1500 B.C. to the present time. The great mass of the literature is in meter, even works on science and law have a poetical form. The oldest literary monuments are the *Vedas*—the *Rig*, the *Yajur*, the *Sama*, and the *Atharva Veda*. They are looked upon as the source of all the *śāstras* or sacred writings of the Hindus, which, however, include works upon ethics, science, and philosophy as well as religious works. The *Purānas* form another important department of the religious literature, but are very much later than the *Vedas*. There are eighteen of them altogether, forming a vast body of literature of varied contents, the subjects treated comprising mythology, legendary history, cosmogony, with many digressions of a philosophical and didactic nature, though some of them also contain descriptions of places, and pretend to teach medicine, grammar, etc. The oldest law book is the *Dharma-Shastra*, ascribed to the mythical personage Manu. In the department of epic poetry the chief productions are the epics called the *Rāmāyana* and the *Mahābhārata*. The *Rāmāyana* is believed to be the older of the two, and to have been current in India as early as the fifth century B.C. The *Mahābhārata* is a huge epic of about 220,000 lines, forming rather a cyclopedia of Hindu mythology, legendary history, and philosophy than a poem with a single subject. It is the production of various periods and various authors. In the province of lyric poetry we meet with poems of the greatest elegance, tender sentiment, and beautiful description of nature. We must mention in particular the *Meghadūta* (Cloud Messenger) of Kālidāsa; the *Ritusanhāra* (Circle of the Seasons) of the same poet; and the *Gītāgovinda* of Jayadeva, describing the adventures of Krishna. Though the Hindus can boast of some excellent specimens of dramatic poetry, yet, on the whole, their dramas are much inferior to those of the Greeks or of modern Europe. The plays are written in mixed prose and verse, and the lower characters and all females are made to speak not in Sanskrit but in *Prākṛit*, only the higher male characters using the former. The Hindu poetic tales and fables have exercised a most important influence on the whole literature of the East, and even on that of our own Middle Ages. Among the collections of this class are the *Panchatantra* (Five Books), from which Europe de-

## Santa Anna

rived the fables of Bidpai (or Pilpay) and the *Hitopadesha* (Salutary Instruction), a somewhat later collection of the same materials; also the twenty-five *Tales of the Demon*, seventy *Tales of the Parrot* (which gave rise to the well-known stories of the *Seven Wise Masters*), etc. The *Kathā-sarīt-sāgara* (Ocean of Streams of Narration), compiled in the eleventh century, is an extensive collection of the best Indian tales. The scientific literature of India is likewise large. Grammar seems to have had a special fascination for the Hindus. The oldest extant grammar is that of Pāṇini, which belongs to the second or third century before Christ. In mathematics and astronomy the Hindus have greatly distinguished themselves, as also in medicine and philosophy. Sanskrit literature was first introduced to the Western world by Sir William Jones in the end of the last century.

**Santa Anna**, ANTONIO LOPEZ DE (1798-1876), Mexican president. He took a prominent part in the expulsion of the Spaniards from Mexico, and proclaimed the Mexican Republic in 1822. He was in the front during all the Mexican troubles till 1833 when he became president. In 1836 he was defeated and taken prisoner by the Texans, but returned the following year. He was again president in 1846 and in 1853-55.

**Santa Barbara**, Santa Barbara co., Cal.; on Santa Barbara Channel, 90 mi. n.w. of Los Angeles. Railroad, Southern Pacific. Oil and gas in vicinity. Surrounding country agricultural. It is known as the "flower city," being the first city in the U. S. to hold flower festivals. The town was first settled in 1786 by the Franciscan Fathers. Population, 1900, 6,587.

**Santa Cathari'na**, a maritime province in the South of Brazil; area 27,436 sq. mi. It is watered by numerous streams, the soil is fertile, the climate mild and the seasons regular. Sugar, coffee, rice, maize, mandioca, and wheat are the chief cultivated products. Agriculture and cattle rearing are the chief industries. There are a number of German settlements, the inhabitants of that nationality being reckoned at 70,000. The capital is Des-terro. Pop. 236,346.

**Santa Cruz**, Santa Cruz co., Cal., 31 mi. n.w. of Monterey, on the Pacific Ocean. Railroad, Southern Pacific. Steamers to San Francisco. Center of fruit growing, agricultural, and dairying district; bitumen quarries near by; lumber, leather, lime, powder, and shoes are also manufactured. Pop. 1900, 5,659.

**Santa Cruz**, capital and chief port of the Canary Islands on the northeast coast of Tenerife. There is an excellent harbor protected by a mole, and the coast is defended by a number of forts. Wine, brandy, and cochineal are the chief exports. Pop. 15,000.

**Santa Cruz de la Sierra**, capital of the department of Santa Cruz in Bolivia, situated on the banks of a small tributary of the Piray. The houses are built of earth and timber with large balconies. Pop. about 14,000.

**Santa Fé**, Santa Fé co., N. M., territorial capital. Railroads: A. T. & S. F.; and Santa

## Santiago

**Fé Southern**. Seat of the University of Mexico, and the center of a mining district where gold, silver, copper, lead, and zinc are produced. It has a large wool product from the sheep raised on the surrounding ranches. Pop. 1900, 5,603.

**Santa Fé**, a town of the Argentine Republic, capital of the province of same name, situated at the confluence of the Salado with the Paraná, 230 mi. n.n.w. of Buenos Ayres, on an unhealthy site. It is the seat of a bishop, has a cathedral, Jesuits' college, etc. The principal trade is in hides and timber. Pop. 10,670.

**Santal' Parganas**, THE, a district in the Bhagalpur division of Bengal; area 5,456 sq. mi. The Ganges, which bounds the district on the n., and partly on the e., forms its chief drainage. Various minerals, as coal, iron, and silver, have been found in this district. Pop. 1,568,093. The district is named from the Santāls, who form the most characteristic portion of its inhabitants, and are also found elsewhere in India. They are one of the aboriginal races belonging to the Dravidian stock, are dark colored, and mostly profess a religion of their own, in which the worship of a chief deity and subordinate deities and a sort of ancestor worship play a chief part. They live chiefly by hunting, and are exceedingly fond of flute playing, dancing, and singing.

**Santander'**, a city and seaport of Northern Spain, capital of the province of same name, on the Bay of Biscay, with a good and secure harbor. There is a town house, small cathedral, theater, two public markets, promenades, etc. It has a large cigar manufactory, foundry, brewery, cooperages, fish-curing establishments, tanneries; besides manufactories of refined sugar, candles, vermicelli, hats, etc. It is also a resort for sea bathing. Pop. 41,870. The province is bounded by Biscay, Burgos, Palencia, and Oviedo, and has an area of 2,111 sq. mi. The soil is fertile and produces large quantities of maize, hemp, flax, oranges, lemons, figs, etc. There are also lead, coal, and iron mines, quarries of limestone and marble. The rearing of cattle is common, and the fisheries along the coast are well developed. Pop. 246,990.

**Santa Rosa**, Sonoma co., Cal., 51 mi. n.w. of San Francisco. Railroads: S. Pacific, and San Francisco & N. Pacific. It is the center of an agricultural district. Exports include leather, wool, canned goods, wine, etc. Pop. 1900, 6,673.

**Santia'go**, the capital of the República of Chile and of the province of the same name, is beautifully situated at the foot of the Andes, 112 mi. by rail e. of Valparaíso. It is intersected by the Mapocho, a rapid stream issuing from the Andes, has water channels in many of the streets, is lighted by electricity, and furnished with tramways. Owing to the prevalence of earthquakes the houses are mostly of one story, and generally occupy a large space of ground, having gardens and patios or courts in the interior. The Plaza or Great Square is a large open area adorned with a fine fountain;



## Santiago de Compostella

around it are the municipal buildings and criminal courts, the post office, the old palace, formerly the residence of the presidents, now used as barracks, the cathedral, etc. There are also a mint, a well appointed university with about 1,000 students, high class secondary schools, school of art, military school, normal schools, theater, museum, etc. The city was founded in 1541. The most memorable event in its history was the burning of a church (1863), in which about 2,000 persons perished. Pop. 236,412.

**Santiago de Compostella**, a city of Spain in Galicia, in the province and 32 mi. s. of Coruña. The chief edifice is the cathedral, a Romanesque building founded in 1078, having in one of the chapels the image of St. James (Santiago) of Compostella (more correctly Compostela), which has long attracted numerous pilgrims. The town has manufactures of leather, linen, etc. Pop. 24,192.

**Santiago de Cuba**, a seaport town on the southeast coast of the island of Cuba. It is the oldest town of the island (having been founded in 1514), is the see of an archbishop, has a fine cathedral, several other churches, and a harbor, which, though difficult of access, is spacious and deep. Its trade is considerable. Pop. 43,090.

**San'tipur**, a town in Nadiya district, Bengal, on the river Hoogli. It is well known for its cloth manufactures, has an annual fair, which lasts for three days, and a considerable local trade. Pop. 29,687.

**San'torin** (Thera, or Calliste), the largest of a small group of islands in the Grecian Archipelago, 60 mi. n. of Crete. It is somewhat crescent-shaped, and has a circuit of about 30 mi., though its breadth nowhere exceeds 3 mi. Wine is the staple of the island. The island is of volcanic origin, and adjoining it are several small islands, thrown up by eruptions in historic times, the last having taken place in 1866. Pop. about 13,000.

**Santos**, a city and seaport of Brazil, in the province and 50 mi. s.s.e. of São-Paulo, on a bay of the South Atlantic. The harbor is the best in the province, and the chief outlet for its products, which are coffee, sugar, tobacco, hides, etc. Pop. about 35,000.

**Sao Francisco** (sá-ŭn-), a river of Brazil, rises in the southwest of the province of Minas-Geraes, flows n.n.e. through that province and the province of Bahia, forms the boundary between the latter province and Pernambuco, and falls into the Atlantic 50 mi. n. e. of the town of Sergipe-del-Rey; length 1,600 mi., with numerous rapids and cataracts, which make its continuous navigation impossible.

**Saône** (sōn) (anc. *Arar*), a river of Eastern France, rises in the Vosges, enters the department of Haute-Saône, then flows through the department of Côte-de'Or, continues southwest and receives the Doubs as tributary, reaches Châlon, where it flows due south until it joins the Rhone at Lyons; length 280 mi., of which 190 are navigable. It is connected by canals with the Rhine, Loire, and Seine.

**Saône**, HAUTE (ôt sōn) ("Upper Saône"), a

## Sap Green

department in the east of France; area 2,028 sq. mi. It is drained by the Saône, the Ognon, etc., and there are many small lakes. A part of the department belongs to the Vosges Mountains. In addition to cereals, flax and hemp are extensively cultivated; the ordinary fruits generally thrive well, and some districts are almost covered with cherry plantations. Iron is extensively worked, but the main occupation is agriculture. Vesoul is the capital. Pop. 280,856.

**Saône-et-Loire** (sōn-ê-lwâr), department of Eastern France; area 3,270 sq. mi. The soil on the whole is not of remarkable fertility, the finest part of the department being the valley of the Saône. The vine is extensively cultivated. The most important mineral is coal, of which there is an extensive field; iron is also worked. There are manufactures of leather, glass, linen, and cotton goods; and the trade is chiefly in agricultural produce, coal, iron, wine, and leather. Mâcon is the capital. Pop. 619,523.

**Sao Paulo** (sá-ŭn-pá' ŭ-lō), a maritime province of Brazil, between the provinces of Minas-Geraes and Paraná; area 112,940 sq. mi. The mountains are generally covered by forests, while on the lower slopes the crops grown are sugar cane, coffee, cotton, maize, mandioc, tobacco, etc. The province has several harbors on the coast, particularly that of Santos. Pop. 1,386,242, including 300,000 Italian colonists and 20,000 Germans. SÃO PAULO, the capital, is the center of the provincial railways, 86 mi. from its seaport Santos, and 143 mi. from Rio de Janeiro. Pop. 35,000.

**Sap**, the juice or fluid which circulates in all plants, being as indispensable to vegetable life as the blood to animal life. It is the first product of the digestion of plant food, and contains the elements of vegetable growth in a dissolved condition. The absorption of nutriment from the soil is effected by the minute root hairs and papillæ, the absorbed nutriment being mainly composed of carbonic acid nitrogenous compounds dissolved in water. This ascending, or as it is termed *crude sap*, is apparently transmitted through the long cells in the vascular tissue of the stem and branches to the leaves, passing from cell to cell by the process known as endosmose.

**Sapajou** (sap'a-jō), the name generally given to a group of South American prehensile-tailed monkeys, including fifteen or sixteen species, whose characteristics it is exceedingly difficult properly to define. Among the species may be named the horned sapajou (also called horned capucin) and the capucin. One of the most common species is the weeper. They are small in size, playful in disposition, leading a gregarious life, and feeding chiefly on fruits and insects.

**Sapan Wood** (Sappan Wood), the wood of the middle-sized leguminous tree, indigenous to Siam, Burmah, India, etc., used as a dye wood. The dye it yields is of a red color, but rather inferior.

**Sap Green**, a pigment prepared by evaporating the juice of the berries of the buckthorn

## Sapodilla

to dryness, mixed with a little alum. It is soluble in water; acids redden it, but the alkalis and alkaline earths restore the green color. It is used by water color painters as a green pigment. Called also *bladder green*, being kept in bladders to dry and harden.

**Sapodilla**, a tree found in the West Indies. The fruit resembles a bergamot pear in shape and size. It is often called *naseberry*, and is much prized as an article of diet. The bark of the sapodilla is used in medicine as an astringent, and the seeds as a diuretic.

**Sapphire** (saf'ir), a precious stone, next in hardness and value to the diamond, belonging to the corundum class. Sapphires are found in various places, as Burmah, India, and Ceylon, in Asia; and Bohemia and Silesia, in Europe. The sapphire proper is a beautiful transparent stone of various shades of blue color.

**Sappho** (saf'ō), a distinguished Greek poetess, b. at Mitylene, on the island of Lesbos, and flourished about 600 B.C. Little is known regarding her life, though she is made the subject of various legends. Of these may be mentioned the common story of her love for Phaon, which, being unrequited, caused her to leap down from the Leucadian Rock. At Mitylene, Sappho appears to have been the center of a female coterie, most of the members of which were her pupils in poetry, fashion, and gallantry. Her odes, elegies, epigrams, of which only fragments have come down to us, display deep feeling and imagination. Her reputation among the ancients almost borders on extravagance.

**Saracen**, an Arabian or other Mussulman of the early and proselytizing period; a propagator of Mohammedanism in countries lying to the west of Arabia. By mediæval writers the term was variously employed to designate the Arabs generally, the Mohammedans of Syria and Palestine, or the Arab-Berber races of Northern Africa. At a later time it was also applied to any infidel nation against which crusades were preached, such as the Turks.

**Saracenic Architecture**, the style adopted by the followers of Mahomet in building their mosques, palaces, and tombs. Originally the Arabs possessed no distinctive architectural style, and the style which they at length made their own was developed by architects belonging to the countries which they had conquered. This style is chiefly represented in Egypt, Persia, Spain, Turkey, and India, but the Saracenic architecture of Spain is generally called by the distinctive name of Moorish. The most prominent features of the style are the dome, the minaret, and the pointed arch. The Saracenic domes rise from a square base, are graceful in form, sometimes in groups of three or more, and frequently enriched externally with colored tiles or other decorations. The minarets are slender towers of considerable height, rising in stages or stories, each with a balcony, and are most frequently octagonal, sometimes cylindrical, rising, however, from a square base. The arch is of the pointed variety, this form of arch having been used by the Arabs in Egypt before the rise of

## Saran

the Gothic in Europe. It is sometimes of the horseshoe form. The use of clustered pendentives (*honeycomb work*) to form a transition from the quadrangular area under a dome to the arch of the dome itself is very peculiar and common. Externally the tops of walls are often finished off with an upright cresting, which may be regarded as an ornament taking the place of a cornice. Flat surfaces are freely ornamented with a profusion of scroll work and conventional foliage, often in intricate and beautiful designs. Stucco is much used in ornamentation. The mosque el-Aksah at Jerusalem, reconstructed by Abd el Malek in A. D. 691, shows evidence of the Christian art of the time in its basilica of seven aisles. In Egypt the Saracenic art began with the mosque which Amru erected at Old Cairo in the 21st year of the Hegira (A. D. 642). Subsequently repaired and altered, it may now be considered as a good specimen of Moslem architectural art when freed from Christian influence. But the perfected Saracenic art dates from the building of a mosque at Cairo by Ibn Tooloon in 876 A. D. This building is nearly square (390 ft. by 455) with a central court, around which on three sides are two ranges of arcades, while on the side toward Mecca there are five. It is built of brick covered with stucco. The mosque and tomb of Kaid Bey, erected in 1463 outside Cairo, is one of the most graceful specimens of Saracenic architecture. The most splendid of Saracenic buildings in Persia was built during the dynasty of the Sufis by Shah Abbas (1585-1629) in his capital of Ispahan. This was the *Maidan* or bazaar, a large rectangular area inclosed by an arcade two stories in height, and to which was attached the great mosque or Mesjid Shah and other buildings. This latter building is 223 ft. by 130, the center compartment being surmounted by a double dome, whose external height is 165 feet. Taken in the mass the Maidan Shah, with its gates and mosques, superbly decorated, is one of the most effective specimens of Saracenic architecture.

**Saragossa** (or Zaragoza), a city of Spain, in Aragon, capital of the province of the same name, as well as of the ancient kingdom of Aragon, about 200 mi. n.e. of Madrid by rail in a fertile plain irrigated by the Ebro. The principal edifices are the two cathedrals, La Seo and El Pilar. The former is the metropolitan archiepiscopal church, and is mainly Gothic in style, dating from the twelfth century; the latter is a huge, unattractive building begun in 1677. Other buildings are the vast archiepiscopal palace, the Torre Nueva, and octangular clock tower for the city, which leans about 9 ft. out of the perpendicular; the old irregular citadel called the Aljaferia, built by the Moors, townhouse, hospitals, exchange, museum, etc. There is a university of three faculties and about 800 students. The chief manufactures are silk, woolen cloth, leather, soap, hats, etc. Pop. 84,575.

**Saran**, a district in the northwest of the Patna division, Bengal, inclosed by the rivers

## Saratoga Springs

Ganges, Gandak, and Gogra; area 2,622 sq. mi. Rice, wheat, and barley are the chief products. Pop. 2,280,382.

**Saratoga Springs**, Saratoga co., N. Y., 40 mi. n. of Albany. Railroads: Fitchburg; D. & H. C. Co.; S. Mt. M. & G.; and Adirondack. In the vicinity are a large number of medicinal mineral springs and it is a fashionable summer resort. Attractions include large hotels, a race course, regattas on Saratoga Lake, etc. Pop. 1900, 12,409.

**Sara'tov**, a city of Russia, capital of the government of same name, is built on broken and undulating ground on the right bank of the Volga, 459 mi. s.e. of Moscow, and surrounded by gardens. Its streets are wide, regular, and well paved, and it has a number of fine buildings, including new cathedral, public offices, theater, railway station, etc. It has manufactures of cordage, pottery, tobacco, woolen cloth, cotton and silk stuffs, etc. Pop. 122,829. The government has an area of 32,613 sq. mi. The eastern boundary is formed by the Volga, but the greater part of the government is drained chiefly by affluents of the Don. The surface is generally diversified by numerous hills and valleys, where a mild climate and good soil combine in raising heavy crops. The principal exports are corn, hemp, flax, tobacco, hops, and madder. Pop. 2,311,220.

**Sara'wak**, a rajahship in the island of Borneo, under British protection. It is situated on the west and northwest side of the island, and has a coast line of about 300 mi., and an undefined semicircular sweep inland; area about 40,000 sq. mi. The soil, consisting generally of black vegetable mold, is peculiarly adapted to the sugar cane, which grows readily even without cultivation; but the more important vegetable productions are cocoanuts, rice, and sago. The minerals include gold, antimony, and quicksilver, and diamonds are also found. The original inhabitants are Dyaks, but are now very much intermixed with Malays and Chinese. Capital Kuching. Pop. 300,000.

**Sarcoph'agus**, a coffin or tomb of stone; a kind of stone chest, generally more or less ornamented, for receiving a dead body. The oldest known sarcophagi are Egyptian, and have been found in certain of the pyramids. Two of the most celebrated of these are the great sarcophagus taken by the British in Egypt in 1801, now in the British Museum, and the alabaster sarcophagus in the Soane Museum, London. Sarcophagi were also used by the Phoenicians, Persians, and Romans; and in modern times stone coffins have not been uncommon for royalty and persons of high rank.

**Sard**, a variety of chalcedony, which displays on its surface a rich, reddish brown, but when held between the eye and the light appears of a deep, blood-red carnelian. Called also *Sardoin*.

**Sardanapa'lus**, the name in Greek of several kings of Assyria, one of whom is said to have been the last king of Assyria. He is represented by Ctesias as a very effeminate prince,

## Sardinia

wholly given to sensual indulgence and inactivity, and it is related that Arbaces, a Median satrap, in conjunction with Belesis, a Babylonian priest, raised an army of Medes against him about 785 B.C. This army, attacking his camp by night, gained a great victory, and pursued the fugitives to the gates of Nineveh. Here Sardanapalus defended himself for two years, but ultimately set his palace on fire and perished in the conflagration with all his wives and attendants.

**Sardine**, a small fish of the same genus as the herring and pilchard, abundant in the Mediterranean and also on the Atlantic coasts of France, Spain, and Portugal. It is much esteemed for its flavor, and large quantities are preserved, by being salted and partly dried, then scalded in hot olive oil, and finally hermetically sealed in tin boxes with hot salted oil, or oil and butter.

**Sardin'ia**, an island in the western half of the Mediterranean, forming part of the Italian kingdom and separated from the island of Corsica by the Strait of Bonifacio, not quite 7 mi. wide; length 152 mi.; central breadth about 66 mi.; area 9,350 sq. mi. The coast is in great part rugged and precipitous, and though the island is nearly in the form of a parallelogram there are some important indentations, such as the Gulf of Asinara in the northwest, the Bay of Oristano in the west, and the Gulf of Cagliari in the southeast, on which Cagliari, the capital of the island, is situated. The interior is generally mountainous; the chain which traverses Sardinia sends out branches east and west, and culminates in Brunca, 6,291 ft., and Gennargentu, 6,132 ft. The streams are numerous, but unnavigable, the largest being the Tirso, which pours its waters into the Gulf of Oristano on the west coast. As regards the geological structure of the island crystalline rocks occupy a considerable area, in which granite, overlaid by gneiss and mica-schist, predominates, but sedimentary rocks are also well represented, as also volcanic formations, a number of ancient craters being traceable. The mineral riches of the island consist chiefly of lead, zinc, copper, quicksilver, antimony, and iron of excellent quality. Iglesias, near the west coast, is the center of the mining district. The other minerals are porphyry, alabaster, marble, lignite, etc. The climate is similar to that which obtains generally over the Mediterranean region. The range of the thermometer is between 34° and 90°, and the mean annual temperature 61° 7'. During the hot season an unhealthy malaria infects the low-lying tracts. The winter months are rainy, and the pleasantest season is in the autumn. Much of the land is of remarkable fertility. The principal crop is wheat; barley, maize, beans, etc., are extensively grown; the vine is well adapted both to climate and the soil; and olive-grounds are met with in various quarters. The rearing of live stock forms an important industry. Game of all kinds is very abundant. Wild boars, stags, deer, and muffsions frequent the woods and forests. The most valuable fishery is that



## Sardinia

of the tunny. Manufactures are chiefly confined to a few coarse tissues woven by the women at their homes for private use. The trade consists of the exports of corn, wine, brandy, timber, fish, cattle, lead, ore, calamine, salt, etc.; the imports include cotton, colonial produce, hosiery, hardware and metals, coal, etc. Railways now traverse the island. For administrative purposes Sardinia is divided into the two provinces of Cagliari and Sassari. The inhabitants are of Italian race, with a mixture of Spanish, and are characterized by a chivalric sense of honor and hospitality, but the family feud or *vendetta* still exists. Education is in a very backward state, and altogether civilization is rather primitive. The early history of the island is involved in much obscurity. It passed from Carthage to Rome in 238 B. C., and latterly came successively into the hands of the Vandals, the Goths, the Longobards, and Saracens. In 1297 Boniface VIII invested the kings of Aragon with Sardinia, and it continued in the possession of Spain till 1708, when it was taken possession of by the British. By the Peace of Utrecht it fell to Austria, and in 1720 to the House of Savoy, being from that time onward part of the kingdom of Sardinia. See next article. Pop. 1901, 789,314.

**Sardinia**, KINGDOM OF, a former kingdom of the south of Europe, composed of the island of Sardinia, the duchy of Savoy, the principality of Piedmont, the county of Nice, the duchy of Genoa, and parts of the duchies of Montferrat and Milan; 28,229 sq. mi.; pop. 5,194,807. In 1720 Victor Amadeus II, duke of Savoy, on receiving the island of Sardinia in exchange for Sicily, took the title of king of Sardinia. He was succeeded by Charles Emmanuel III, Victor Amadeus III, and Charles Emmanuel IV, who in 1802 abdicated in favor of his brother Victor Emmanuel I, the royal family having by this time, during the domination of Napoleon, taken refuge on the island of Sardinia. In 1814 the king returned to Turin, where the seat of government was established. An insurrection occasioned his abdication in 1821 in favor of Charles Felix, who, after a reign of ten years, was succeeded by Charles Albert. In 1848 he headed the league which endeavored to drive the Austrians from Italy. The defeat of the Sardinian forces at Novara (1849) by Radetsky, however, caused him to abdicate in favor of his son Victor Emmanuel II. The position of Sardinia was strengthened by the part which it played (1854) in the Crimean War, while in 1859 the co-operation of France was secured in a war against Austria. The brief campaign which followed ended in the defeat of the Austrians at Magenta and Solferino, and led to Sardinia receiving a large increase of territory, though she had to cede Savoy and Nice to France. Soon after this the Sardinian kingdom was merged in a united Italian kingdom under Victor Emmanuel.

**Sard'onix**, a precious stone, a beautiful and rare variety of onyx, consisting of alternate layers of sard and white chalcedony. The

## Sarthe

name has sometimes been applied to a reddish yellow or nearly orange variety of chalcedonic quartz resembling carnelian, and also to carnelians whose colors are in alternate bands of red and white.

**Sardou**, VICTORIEN (1831- ), French dramatist, b. at Paris. The son of a professor, he at first studied medicine, but abandoned this in favor of literature. His earliest venture was the comedy of *La Taverne des Etudiants*, which proved a failure at the Odéon. He was successful, however, with two plays which he wrote for Déjazet called *M. Garat* (1860) and *Les Prés-Saint-Gervais* (1862). His better-known works, many of which have been produced on the English stage, are *Les Pattes de Mouche*, *Nos Intimes*, *La Patrie*, *Daniel Rochat*, and *Dora*. His later successes have been associated with Madame Bernhardt, for whom he has written *Fédora*, *Théodora*, and *La Tosca*.

**Sargent**, EPES (1812-1880), poet and dramatist, was b. at Gloucester, Mass.; d. at Boston. He was educated in the latter city and at Harvard University; became associated with the Boston *Advertiser* and the *Atlas*; removed to New York, where he was assistant on the *Mirror*; and subsequently returned to Boston to become editor of the *Evening Transcript*. He afterward devoted himself entirely to literature, and produced, among other plays, *The Bride of Genoa*, a poetical drama; *Velasco*, a tragedy; various novels and books of adventure; a *Life of Henry Clay* (1852); and two volumes of poetry. He was the author of that well-known lyric, *A Life on the Ocean Wave*.

**Sark** (or Sercq), one of the Channel Islands, situated about 8 mi. from Guernsey. It is divided into Great Sark and Little Sark, the connection between these being a narrow neck of land called the Coupée; length about 5, and breadth about 3 mi. The island is surrounded by almost inaccessible rocks, and the carriage-ways are steep. Fishing, which is the chief employment, is now facilitated by a new pier, and the manufactures are principally stockings, gloves, etc. Pop. 578.

**Sarmatians**, a people of supposed Asiatic race, who, in the time of the Romans, occupied the vast region between the Black, Baltic, and Caspian seas. They were a nomadic race, whose women went to war like the men, and they were said by tradition to be descended from the Amazons, by Scythian fathers. Sarmatia coincided in part with Scythia, but whether the people were of the same race is doubtful.

**Sar'nia**, a town of Canada, province of Ontario, on the river St. Clair, near where it issues from Lake Huron, and opposite Port Huron. It is a flourishing place, with various manufactures, and a large trade by railroad and steamer. Pop. 6,693.

**Sarpe'don**, in Greek mythology, a son of Zeus and Laodamia, king of the Lycians and ally of the Trojans. He was slain by Patroclus.

**Sarthe** (sárt), a department of Northwest France; area 2,395 sq. mi. It has a diversified surface, presenting fertile plains, vineyards,

## Sarto

and extensive forests. Wheat, oats, barley, beet root, and hemp are grown, while cider and wine are largely produced. The only mineral of any consequence is iron, but there are excellent sandstone, limestone, millstone, slate, and marble quarries. The capital is Le Mans. Pop. 436,111.

**Sarto, GIUSEPPE.** See *Pius X.*

**Sarti, GIUSEPPE** (1729-1802), an Italian composer. At the age of twenty-two his first opera, *Pompeo in Armenia*, was put upon the stage at Faenza, his native place. Other operas soon followed, and he became successively court chapel master at Copenhagen; director of the Conservatory dell' Ospedaletto at Venice, and chapel master of the Milan cathedral. In 1784 he was invited by the Empress Catherine to St. Petersburg, where he founded a musical conservatory. He wrote in all about thirty operas, and was teacher to Cherubini.

**Sa'sin**, the common Indian antelope, remarkable for its swiftness and beauty. It is abundant in the open dry plains of India, in flocks of from ten to sixty females to a single male. It is grayish brown or black on the upper parts of the body, with white abdomen and breast, and a white circle round the eyes, and stands about 2 ft. 6 in. high at the shoulder.

**Saskatch'ewan**, a great river of Canada, which rises in the Rocky Mountains by two principal heads. These branches, often called the North and the South Saskatchewan, flow generally east to their junction about 150 mi. n.w. of the northwest angle of Manitoba, whence the river takes a curve northeast and southeast, and, passing through Cedar Lake, empties itself into Lake Winnipeg, after a course of about 1,300 mi., measuring along the south branch, some 70 less, measuring along the north. It is fed by numerous tributaries, and flows through a region yielding coal, salt, iron, etc., having a fertile soil, and now attracting numbers of settlers. The main stream and its branches afford about 1,000 mi. of navigable waterway.

**Saskatchewan**, formerly a district of Canada named from the above river, bounded by Assiniboia, by Lake Winnipeg and Nelson River, by the 55th parallel and by Alberta. In 1905 it was made into a province, along with Alberta, out of the districts known as the Northwest Territory. Both provinces are self-governed and are destined to prosperity.

**Sassaby**, an antelope found in South Africa, living gregariously in herds numbering from six to ten individuals. The body color is a reddish-brown, the limbs being of dark hue, while a blackish strip marks the forehead and middle of the face.

**Sas'safras**, a genus of plants, of which the species most known is the sassafras laurel, on account of the medicinal virtues of its root. It is a small tree or bush inhabiting the woods of North America from Canada to Florida. The taste of sassafras is sharp, acrid, aromatic; it is used for flavoring purposes, and in medicine as a stimulant. *Swamp sassafras* is the *Magnolia glauca*, an American tree.

## Satire

**Sassan'idæ**, a Persian dynasty of kings, which succeeded the Parthian dynasty of the Arsacidæ, and reigned from 226 B.C. to about A.D. 636. The dynasty began with Ardishîr Babigân, and owes its name to the grandfather of that prince, named Sassan.

**Sas'sari**, a town of Italy, in Sardinia, capital of the province of same name, 105 mi. n.n.w. of Cagliari. The only manufacture of importance is tobacco, and the trade is chiefly in grain, oil, cheese, and goat skins. Pop. of town 31,596; of province occupying the north and more fertile part of the island, 261,367.

**Sata'ra**, a district in the Bombay presidency, India, area 4,987 sq. mi., forming part of the table-land of the Deccan, much broken by ridges, ravines, and isolated heights. The chief river is the Kistna, which flows southeast through its center. Pop. 1,062,350. The capital of the district is also called Satára, and is situated near the confluence of the Krishna and the Yena. Pop. 28,601.



Sassafras (*Sassafras officinale*); a.—branch of male tree in flower; b.—branch with ripe fruit and developed foliage. (Bentley and Trimen.)

**Sat'ellite**, a secondary planet, or moon; a small planet revolving round a larger one. The earth has one satellite, called the moon; Neptune is also accompanied by one; Mars by two; Uranus by six; Jupiter by four; Saturn by eight. Saturn's rings are supposed to be composed of a great multitude of minute satellites.

**Satin**, a soft, closely woven silk, with a glossy surface. In the manufacture of satin part of the weft is left beneath the warp, which, presenting a close and smooth surface, acquires, after being passed over heated cylinders, that luster which distinguishes it from other kinds of silks.

**Satin Bird**, an Australian bird, so called from the glossy, dark purple plumage of the male. It is one of the bower birds.

**Satire**, in the widest sense of the word, pungent ridicule or cutting censure of faults, vices, or weaknesses. In a narrower sense it is a poem, of which ridicule and censure are the

## Saturday

object and chief characteristic. This species of poetry had its origin with the Romans, but satires may also take the forms of epistles, tales, dialogues, dramas (as with Aristophanes), songs, epics, fables, etc. The didactic satire originated with Lucilius, and Horace, Juvenal, and Persius developed it. Satirists are common in all modern literatures.

**Saturday** (A. Sax. *Saterdag*, *Saterdag*—*Sæter*, *Sætern*, for Saturn, and *dæg*, a day—the day presided over by the planet Saturn), the seventh or last day of the week; the day of the Jewish Sabbath.

**Saturn**, an ancient Italian deity, popularly believed to have made his first appearance in Italy in the reign of Janus, instructing the people in agriculture, gardening, etc., thus elevating them from barbarism to social order and civilization. He was consequently elected to share the government with Janus, and his reign came afterward to be sung by the poets as the "golden age." He was often identified with the Cronus of the Greeks. His temple was the state treasury. Ops was his wife. He is often represented as an elderly man, with sickle and ears of corn in his hand.

**Saturn**, one of the planets of the solar system, less in magnitude than Jupiter, and more remote from the sun. Its mean diameter is about 70,000 mi., its mean distance from the sun somewhat more than 872,000,000 mi., and its year or periodical revolution round the sun nearly twenty-nine years and a half. Its mass is about 90 times that of the earth. Saturn is attended by eight satellites, and surrounded by a system of flat rings, which are now supposed to be an immense multitude of small satellites, mixed probably with vaporous matter.

**Saturna'lia**, a festival held by the Romans in honor of Saturn, and during which the citizens, with their slaves, gave themselves up to unrestrained freedom and mirth. It contained at first one day; then three; afterward five; and finally, under the Cæsars, seven days, namely, from the 17th to the 23d of December. During its continuance no public business could be transacted, the law courts were closed, the schools kept holiday, and slaves were free from restraint. Masters and slaves even changed places, so that while the servants sat at table, they were waited on by their masters and their guests. In the last days of the festival presents were sent by one friend to another.

**Satyrs**, in Greek mythology a class of woodland divinities, in later times inseparably connected with the worship of Dionysus (Bacchus). The satyrs appear in works of art as half man and half goat, having horns on the head, and a hairy body with the feet and tail of a goat. They are described as being fond of wine and every kind of sensual gratification. One of the most famous specimens of Greek art is the *Satyr of Praxiteles*.

**Saugor** (or Sâgor), a district of the Jabalpur division, Central Provinces, India; area 4,005 sq. mi. In some parts the soil is good, and wheat is grown in large quantities. The district is administered by a deputy commissioner. Pop. 564,950. The principal town has

## Savannah

the same name, and is situated near a fine lake surrounded by hills, about 180 mi. n. of Nagpur. Pop. 44,416.

**Saul**, king of Israel from about 1095 to 1056 B. C., and the son of Kish, a Benjamite. Selected for this office by Samuel, he obtained, by his personal courage and military capacity, several successes over the Philistines, Edomites, Moabites, and Ammonites, by means of which he consolidated the tribes and confirmed his authority. He was succeeded by David.

**Sault Ste Marie**, a town of Chippewa co., Mich., 356 m. n. w. of Detroit, at the outlet of Lake Superior. Railroads: The Soo Line, S. S. & A. and C. P. Industries: saw mills, planing mills, steel works, tanneries, bottling works, foundries, flour mills and several others. Two government locks transfer shipping from Lake Superior to the St. Mary's river, and from the river to the lake. The largest of these has a chamber 800 ft. long, 100 ft. wide, admits vessels drawing 21 feet of water and has a lift of 18 ft. It is the largest canal lock in the world. The shipping passing through these locks exceeds that of the Suez Canal. A large power canal was completed in 1902, which leads from the lake above the rapids to the river, two miles below. This canal is 2 m. long, 200 ft. wide and 30 ft. deep. It is connected with a power house containing 320 turbines each having 125 horse power, the largest power house in the world. Population in 1900, 10,538; 1903, 14,000.

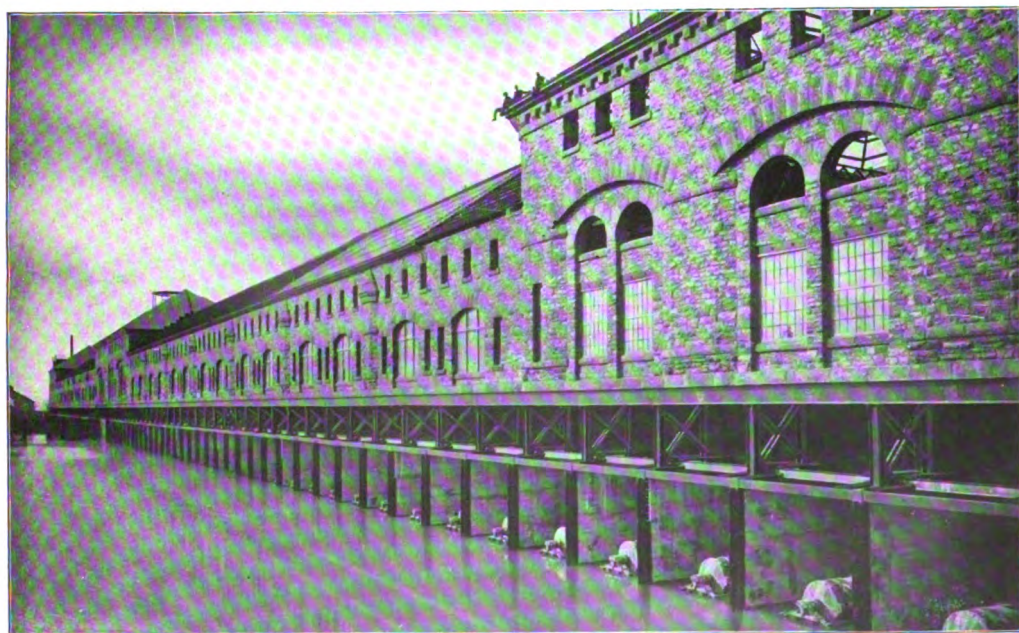
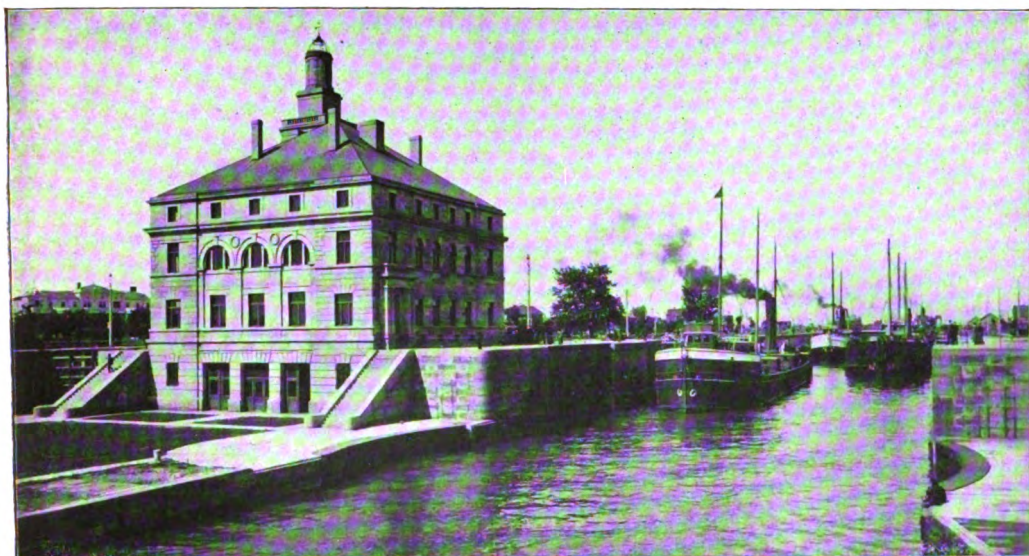
**Saury Pike**, or *Skipper*. See *Pike*.

**Savage Island**, a small coral island in the Pacific Ocean, lat. 19° s., lon. 170° w. It is about 30 mi. in circuit, and has a population of 5,000 nominal Christians. It was annexed by Britain in 1888.

**Savan'nah**, a river, which forms the northeast boundary of Georgia, and separates it from South Carolina. It is formed by the junction of the Tugaloo and Keowee, 100 mi. by the course of the river above Augusta, and is navigable for vessels drawing over 18 ft. to the city of Savannah, 18 mi. from the sea.

**Savannah**, county seat of Chatham co., Ga.; chief seaport of the state; at the mouth of the Savannah river, and on the Cent. of Georgia, the Plant System, the Southern and the Seaboard Air Line railroads. Savannah has an excellent harbor with lines of steamships running regularly to Baltimore, Philadelphia, New York and Boston. Its commercial relations with these and foreign ports are extensive. In the shipment of cotton, it ranks among the leading cities of the U. S., and it is the largest market for naval stores in the world. Besides cotton and naval stores, it exports largely lumber and rice, and ships great quantities of fruits and vegetables to the Northern markets. Its chief manufactures are fertilizers, cotton-seed oil, soaps, beer, cars, yarn, foundry and machine-shop products and boilers. Rice cleaning is an important industry. Savannah is one of the most beautiful cities in the United States. It has many fine parks, a valuable art museum and an extensive library under the direction





SAULT STE. MARIE. MICHIGAN.

THE POE LOCK

POWER HOUSE POWER CANAL

LIBRARY  
OF THE  
UNIVERSITY OF ILLINOIS

## Save

of the Georgia Historical Society. It is the seat of a Roman Catholic bishopric. On the site of Christ Church, the oldest Protestant edifice, John Wesley founded the first Sunday School in America. Savannah was settled by Oglethorpe in 1733. It was the scene of important military operations during the American Revolution and the Civil War. The city contains monuments to Nathaniel Greene and to Sergeant Jasper. Pop. 1900, 54,244.

**Save** (sǎ'vè) (incorrectly *Sau*), a river of Austria, rises in the Julian Alps, flows south-east through Carniola, separates Carniola from Styria, flows through Croatia, and after a course of about 540 mi. joins the Danube at Belgrade. It is in great part navigable.

**Savings Banks.**—The formation of savings banks was first suggested in England in 1697, and the first savings bank established in Europe is said to have been at Brumath, France, in 1765. This was followed by one in Loire in 1790. The first German savings bank was established at Hamburg in 1778; the first Switzerland savings bank at Berne in 1787. The first English bank was established in 1799. Post-office savings banks were established in England in 1861. They are designed to grant additional facilities for depositing small savings at interest, with the direct security of the state for the repayment of the deposits.

In the U. S. the Philadelphia Saving Fund Society was founded in 1816 and received a charter in 1819; and between 1817 and 1846 twelve states had granted such charters to savings banks within their bounds, especially the New England states; fifty years later there were 684 banks in the U. S. These banks do not belong to any connected national system, each being regulated by the legislature of its own state, but on the whole they closely resemble one another in their main features. Before 1870 there were very few failures of savings banks; but in the seven years that followed no less than twenty-nine failed in the state of New York alone, not by reason of fraud, but mainly on account of commercial depression, the panic of 1873, and injudicious investments. In 1874 the constitution of New York state was modified so as to prevent the legislature from sanctioning any savings bank not strictly conforming to rigorous conditions, fixing the duties and responsibilities of trustees, prescribing the rate of interest (never to exceed 5 per cent. until a surplus of 15 per cent. of deposits had been accumulated), and specifying stocks in which such banks may invest. These regulations have been adopted by other states. Most of the states have endeavored, ineffectually, to prevent the savings banks from becoming rivals to other banks. The following table shows the progress of savings banks in the U. S.:—

	<i>Banks.</i>	<i>Depositors.</i>	<i>Total Deposits.</i>
1825.....	15	16,931	\$ 2,537,082
1845.....	70	145,206	24,506,677
1875.....	771	2,359,864	924,037,304
1885.....	684	3,158,950	1,141,530,578
1890.....	921	4,258,623	1,524,844,506
1901.....	1,007	6,373,098	2,601,189,291

## Savoy

**Savonarol'a**, GIROLAMO (1452-1498), an Italian reformer born at Ferrara, Sept. 21, 1452. At an early age he entered the convent of the Dominicans at Bologna, where he studied industriously and soon became professor of philosophy and theology. The Renaissance in Italy was signalized by a criminal licentiousness that revolted the moral sensibility of the youthful monk. When he was admitted to Holy Orders he began preaching in Ferrara, but soon went to Florence, where in 1491 he was elected prior of the convent of San Marco. Having persuaded himself that he was prophetically inspired, he assumed to foretell impending calamities. He was intensely enthusiastic and earnest in his efforts to reform the morals of the period. Feeling that the church required purification, he fearlessly assailed Alexander VII, who was then Pontiff. In 1494, when Charles VIII invaded Italy, Savonarola went to him and by the religious fervor of his appeal had Florence spared from invasion. He took a prominent part in framing the constitution of the Florentine Republic and opposed the pretensions of the Medici to regain the dominion of Florence, proclaiming death for those who conspired against the republic. The Medici had a strong influence at the Vatican, which resulted in the issue of a papal brief commanding Savonarola to appear in Rome to explain why he represented himself to be inspired by God. He pleaded illness and danger from his enemies for not complying with the papal mandate. According to some authorities Pope Alexander then issued a bull of excommunication against him. Savonarola, however, continued his clerical duties, and, defying the plague then raging in Italy, went about among the sufferers and administered the sacraments of the Church to the dying. But it was soon evident that he had somehow lost his hold on the Florentine populace. On April 9, 1498, the convent of San Marco was attacked and Savonarola and two of his fellow monks made prisoners. Six weeks after their arrest they were led to execution. In the interval between his condemnation and death, Savonarola devoted himself to prayerful preparation. Savonarola's writings consisted of sermons, theological works and a treatise on the government of Florence.

**Savoy**, DUCHY OF (Italian, *Savoja*; French, *Savoie*), formerly a division of the Sardinian kingdom, now forming two of the departments of France; bounded on the n. and n.e. by Switzerland, on the e. and s.e. by Piedmont, and on the s. and w. by the French departments of Isère and Ain. Savoy belongs entirely to the basin of the Rhone, and is separated from Switzerland by the Lake of Geneva. The climate is in general cold, the winters are long and severe, and the summers frequently follow without an intermediate spring. The vine is cultivated with success, but the chief riches of the country are in its cattle and dairy produce. By treaty (1860) Savoy was ceded by Sardinia to France, of which it now forms two departments—Savoie, area 2,224 sq. mi., pop. 263,297; and Haute Savoie, area 1,667



## Savoy

sq. mi., pop. 268,267. The capital of the former is Chambéry, of the latter Annecy.

**Savoy**, HOUSE OF, one of the oldest royal houses of Europe, now represented by the king of Italy. Humbert White Hand, the reputed descendant of Wittekind, the last of the Old Saxon kings, was the first of the family who took a prominent place among the princes of Northern Italy. The family dominions continued to increase, and under Amadeus II (1103-49) were raised to a county of the empire (1111), and now received the name of Savoy. Count Thomas I (1188-1233) obtained important accessions of territory in Chambéry, Turin, Vaud, etc. Amadeus IV (1233-53) obtained the submission of the city of Turin to his rule. Amadeus VI lent his aid to the Greek emperor, John Palæologus, against the Turks and the Bulgarians, united the lordships of Cherasco, Coni, Gex, and Valromey to his possessions. His son, Amadeus VII (1383-91), forced the Count of Provence to cede to him Nice and Vintimiglia. Amadeus VIII, grandson of the preceding (1391-1451), received the ducal title from the Emperor Sigismund in 1416, and acquired the county of Geneva, together with Bugey and Vercelli. The elder male line became extinct in 1496, and the crown devolved on the nearest collateral heirs, Philibert II (1497-1504) and his brother Charles III (1504-53). The latter aided the emperor Charles V, against Francis I of France, and was finally deprived of all his territories by the French king. But his son Philibert Emmanuel, surnamed the Iron Head (1553-80), succeeded in gaining back the greater part of the paternal domains. Charles Emmanuel I (1580-1630) was prompted to reconquer the marquisate of Saluzzo, but Henry IV of France invaded Savoy and Piedmont, and compelled the duke to give up Bugey, Valromey, and Gex. His son, Victor Amadeus I, regained these possessions, and added to them Montferrat, Alba, and some other places. Victor Amadeus II (1675-1730), grandson of the first of that name, at the beginning of the War of the Spanish Succession, sided with France, but afterward transferred his services to Austria. By the Treaty of Utrecht (1713), he received a part of the Duchy of Milan, along with the island of Sicily, which conferred upon him the title of king; but in 1720 he was compelled to give up Sicily to Austria in exchange for Sardinia, which, along with Savoy, Piedmont, and his other dominions, became the kingdom of Sardinia.

**Savu** (Savou, or Savoe), an island of the Malay Archipelago, southwest of Timor; area 237 sq. mi. It yields millet, maize, sugar cane, cotton, tobacco, etc., and its Malayan inhabitants are subject to the Dutch government of Timor. Pop. 35,000.

**Savantwa'ri**, a native state in the Bombay presidency, situated about 200 mi. s. of Bombay, bounded n. and w. by the British district of Ratnagiri, and on the s. by the Portuguese territory of Goa; area 900 sq. mi.; pop. 174,433.

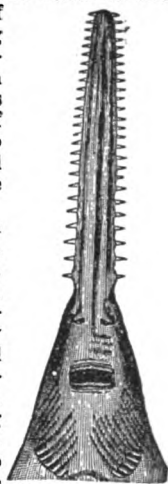
**Saw Fish**, a fish nearly related to the one

## Saxe

hand to the sharks, and on the other to the rays. It attains a length of from 12 to 18 ft., has a long beak or snout, with spines projecting like teeth on both edges, armed with which it is very destructive to shoals of small fishes, and is said to attack and inflict severe and even mortal injuries on the large cetaceans or whales.

**Saws** are instruments with a dentated or toothed edge, employed to cut wood, stone, ivory, or other solid substance, and are either straight or circular. In form and size they vary from the minute surgical or dental tool to the large instrument used in sawmills. The *cross-cut saw*, for cutting logs transversely, is a large, straight saw worked by two persons, one at each end. The *ripping saw*, *half ripper*, *hand-saw*, and *panel saw* are saws for the use of one person, the blades tapering in length from the handle. *Tenon saws*, *sash saws*, *dovetail saws*, etc., are saws made of very thin blades of steel stiffened with stout pieces of brass, iron, or steel fixed on their back edges. They are used for forming the shoulders of tenons, dovetail joints, etc., and for many other purposes for which a neat, clean cut is required. *Compass and keyhole saws* are long, narrow saws, tapering from about 1 in. to  $\frac{1}{4}$  in. in width, and used for making curved cuts. Machine saws are comprehended under three different classes—circular, reciprocating, and band saws. The *circular saw* is a disk of steel with saw teeth upon its periphery. It is made to revolve with great rapidity and force, while the log is pushed forward against it by means of a traveling platform. The *reciprocating saw* works like a two-handled hand-saw, being driven upward and downward and the wood carried forward against its teeth. The *band saw* or *ribbon saw* consists of a thin, endless saw placed like a belt over two wheels, and strained on them. The ribbon passes down through a flat sawing table, upon which the material to be cut is laid. Saws for cutting stone are without teeth. The sawing of timber is an important industry in some countries, especially the U. S. and Canada, where immense quantities of lumber are produced. Water power is often employed to drive the machinery of the sawmills, but steam is equally common.

**Saxe** (saks), HERMANN MAURICE, COMTE DE (1696-1750), marshal of France, natural son of Augustus II, king of Poland, by Aurora, countess of Königsmark, b. at Dresden. After the treaties of Utrecht and Passarowitz he withdrew to France, and at Paris made himself intimately acquainted with professional tactics. On the death of his father he declined the command of the Saxon army, offered him by his brother Augustus III, and joined the French



Lower view of Head of Saw Fish.

## Saxe

with whom he distinguished himself at Dettingen and Philippsburg, and in 1744 was rewarded with the staff of a marshal of France. He was employed in the war that followed the death of the emperor Charles VI, and in 1745 gained the famous battle of Fontenoy. In 1747 he was victorious at Laufeldt, and in the following year took Maestricht, soon after which the Peace of Aix-la-Chapelle was concluded. He wrote a treatise entitled *Mes Réveries*, on the art of war.

**Saxe, JOHN GODFREY** (1816-1887), American litterateur. He studied law, but ultimately took to journalism and literature. His poems, many of which are of a humorous character, have been very popular in America. They include *Progress*, a satirical poem; *Humorous and Satirical Poems*; *Money King*; *Flying Dutchman*; *Clever Stories of Many Nations*; *The Masquerade*; *Fables and Legends*; and *Leisure Day Rhymes*.

**Saxe-Altenburg** (saks-al'tén-burg), an independent duchy in Thuringia, forming one of the states in the German Empire, is divided into two nearly equal portions by a part of Reuss, and is bounded on the s. w. by the grand-duchy of Saxe-Weimar-Eisenach, on the n. by Prussia, and on the e. by Saxony; area 510 sq. mi. The eastern or Altenburg division is very fertile, while the western or Saal-Eisenburg portion is hilly and wooded. The duchy is represented by one vote in the Bundesrath and one vote in the Reichstag of the German Empire. The capital is Altenburg. Pop. 170,864.

**Saxe-Coburg-Gotha** (saks'ko-burg-gōta), a duchy of Central Germany, one of the states of the German Empire, comprising the province of Gotha, lying between Prussia, Schwartzburg, Meiningen, and Weimar, and the province of Coburg, lying between Meiningen and Bavaria; Coburg 218 sq. mi., and Gotha 542 sq. mi. The chief occupations of the inhabitants, particularly in Coburg, are cattle rearing and agriculture. In Gotha there are manufactures of linen, leather, metal wares, etc. The government is a constitutional monarchy, and each province has its own elective assembly, while the duchy sends one member to the Bundesrath and two to the Reichstag of the German Empire. For affairs common to both divisions the assemblies meet conjointly at Coburg and at Gotha alternately, the two chief towns of the duchy. The ducal house and the greater part of the population profess the Lutheran faith. The late prince consort was the younger brother of the present duke (Ernest II), and Prince Alfred of Great Britain, duke of Edinburgh, is the heir apparent to the duchy. Pop., Coburg, 57,383; Gotha, 141,446; total 206,513.

**Saxe-Meiningen** (saks-mī'ning-en), a duchy of Central Germany, and one of the states of the German Empire, consisting of a main body, and several minor isolated portions. Area 955 sq. mi. The greater part of the surface is hilly, and the principal crops are oats, buckwheat, potatoes, turnips, hemp, and the pastures rear considerable numbers of cattle, sheep, and horses. The minerals

## Saxons

include iron and copper, worked to a small extent, and the manufactures are chiefly iron-ware, porcelain, glass, etc. The government is a hereditary and constitutional monarchy, and the great majority of the inhabitants are Lutherans. The duchy sends one member to the Bundesrath and two to the Reichstag of the German Empire. The capital is Meiningen. Pop. 223,832.

**Saxe-Weimar** (or Saxe-Weimar-Eisenach) (saks-wi'mär), a grand duchy of Central Germany, one of the states of the German Empire, and consisting of three larger portions, Weimar, Neustadt, and Eisenach, and twelve smaller parcels. Area of the whole, 1,421 sq. mi. The forests are very extensive, and form the principal wealth of the grand duchy. The minerals are unimportant. In Eisenach woolen, cotton and linen tissues, ribbons and carpets, etc., are made. The chief town is Weimar, and there is a university of considerable repute at Jena. The government is constitutional, the legislative power being vested in a house of parliament, consisting of one chamber of thirty-one members. Saxe-Weimar sends one member to the Bundesrath and three to the Reichstag of the German Empire. Pop. 326,091.

**Sax'ifrage**, a popular name of various plants. The species are mostly inhabitants of alpine and subalpine regions of the colder and temperate parts of the northern zone. Most of them are true rock plants, with tufted foliage and panicles of white, yellow, or red flowers; and many are well known as ornamental plants in our gardens. The genus is a large one, containing upward of 150 species, of which at least 50 are natives of North America.

**Saxo Grammaticus** (that is, Saxo the Grammarian, or the Learned), the most celebrated of the old Danish historians, who flourished in the twelfth century. He is supposed to have been a native of Denmark, of which kingdom and its dependencies he compiled (in Latin) an elaborate history down to 1186. Saxo was a priest in the cathedral of Roskilde.

**Saxons**, a Teutonic race whose name is generally derived from the old German word *saks* (a knife or short sword). They are first mentioned by Ptolemy, who speaks of them as inhabiting a district bounded by the Eider, the Elbe, and the Trave. In the third century of the Christian era they were a numerous, warlike, and piratical people. In the fifth century considerable hordes of them crossed from the Continent and laid the foundations of the Saxon kingdoms in Britain—Essex or East Saxons, Sussex or south Saxons, etc. Those who remained in Germany (Old Saxons) occupied a great extent of country, of vague and varying limits, which bore the general name of Saxony. Charlemagne waged a thirty years' war against



## Saxon Switzerland

the Saxons; and Wittikind, their national hero, with many of his countrymen, submitted to his arms, and embraced Christianity.

**Saxon Switzerland**, a name which has been given to part of the kingdom of Saxony, on the Elbe, s.e. of Dresden and bordering on Bohemia. It consists of a group of mountains of sandstone, with valleys and streams of the most picturesque character, in which isolated masses of sandstone, large and small, occur in very fantastic shapes. It is about 24 mi. long, and equally wide.

**Saxony**, KINGDOM OF, a kingdom of Central Germany; bounded on the n.w., n., and e. by Prussia, s.e. and s. by Bohemia, s.w. by Bavaria, and w. by Reuss, Saxe-Weimar, and Saxe-Altenburg; greatest length 135 mi.; greatest breadth 75 mi.; area 5,786 sq. mi. (or rather less than Yorkshire); pop. 1901, 4,199,758. For administrative purposes it is divided into the four districts of Dresden, Leipsic, Zwickau, and Bautzen or Budissin.

*General Features.*—With the exception of a very small portion of the east, which sends its waters to the Baltic, Saxony belongs to the basin of the Elbe, which traverses it in a north-westerly direction for about 70 mi. Of its tributaries the most important are the Mulde and the Elster. The surface, though very much broken, may be regarded as an inclined plane, which commences in the south, in the Erzgebirge chain, and slopes toward the north. In the more elevated districts the scenery is wild, while on either side of the Elbe, from the Bohemian frontier to Pirna, is a remarkable tract, covered with fantastic sandstone formations, which has received the name of the Saxon Switzerland. On the Prussian frontiers, where the district subsides to its lowest point, the height above the sea is only 250 ft. The loftiest summits are generally composed of granite and gneiss, and are rich in mineral products. The Erzgebirge is continued by the Riesengebirge, a branch of which, under the name of the Lausitzer-gebirge, or Mountains of Lusatia, covers a considerable portion of the east of Saxony. The climate in the loftier mountain districts is very cold, but with this exception it is milder than that of most countries of Europe under the same latitude.

*Productions, Industries.*—The most important crops are rye, oats, barley, wheat, potatoes, and orchard fruits, particularly apples, pears, and plums, are very abundant. Considerable attention is paid to the culture of the vine. Large numbers of horned cattle are exported. The wool of Saxony has long been celebrated for its excellence. Swine and horses are of a superior breed. The minerals are of great importance, and include silver, lead, tin, iron, cobalt, nickel, bismuth, and arsenic. Numerous seams, both of lignite and coal, are found in various districts, and are worked to a considerable extent. The quarries furnish in abundance granite, porphyry, basalt, marble, serpentine, and sandstone. Several mineral springs of reputation exist. Saxony is an important manufacturing country. The principal manufactures are cotton and woolen

## Saxony

goods, linen, lace, ribbons, and straw plaiting. Other industries are earthenware, Dresden ware, leather, chemicals, etc., and the printing establishments of Leipsic are well known. Saxony is connected with the great trunk lines which traverse Central Europe, and has (1892) 1,624 mi. of railway.

*Administration, etc.*—The government is a constitutional monarchy (forming part of the German Empire), in which the executive power is lodged solely in the crown, and the legislative power jointly in the crown and two chambers. The members of both houses are paid for their services, the amount (\$3 per day during the session) being the same for the members of each house. Justice is administered by three classes of courts, namely, courts of primary, secondary, and tertiary resort or instance. In religion universal toleration is guaranteed; but the religious body recognized by the state is the Lutherans. At the head of the educational establishments of the kingdom is the University of Leipsic, and there are gymnasia in the principal towns. The army is raised chiefly by conscription—all male citizens being bound to serve for three years in the active service, four years in the reserve, and five in the Landwehr. As a member of the German Empire Saxony has four votes in the Federal Council, and sends twenty-three deputies to the Reichstag. The chief towns are Dresden (the capital), Leipsic, Chemnitz, Zwickau, Plauen, and Freiberg.

*History.*—The present ruling family in Saxony claims descent from Wittikind, the national hero who was conquered by Charlemagne and embraced Christianity. The territory became a duchy about 880, and in the tenth century Duke Henry was elected German emperor. In 1127 the duchy passed to the Bavarian branch of the Guelph family, and after several changes Frederick the Warrior, margrave of Meissen and landgrave of Thuringia became (1423) elector of Saxony. His grandsons, Ernest and Albert, in 1485 divided the family possessions, founding the Ernestine and Albertine lines respectively, the former retaining the electoral dignity. Ernest was succeeded by his sons, Frederick III (1486–1525) and John (1525–1532), but in 1548 the elector of the Ernestine line was put under the ban of the empire and the electorate transferred to Maurice, who represented the Albertine line which now occupies the throne. Maurice was succeeded by his brother Augustus (1553–86), who made important additions to the Saxon territories by purchase and otherwise. His son, Christian I, d. in 1691, leaving his crown to his son, Christian II. Christian's brother and successor, John George I (1611–56), joined Gustavus Adolphus in the Thirty Years' War, and the Saxon forces took part at Breitenfeld and at Lützen. Frederick Augustus I (1694–1733) embraced the Catholic religion (1697) to obtain the crown of Poland. Frederick Augustus II also obtained the Polish crown (as Augustus III) after a war with France, and joined with Austria in the Seven Years' War. Frederick Augustus III (1763–1827) reluctantly



## Saxony

took part against France when war was declared by the imperial diet in 1793, but after the battle of Jena the elector and his army fought side by side with the French. Napoleon conferred upon him the title of king, and large additions were made to the Saxon territory in 1807 and 1809. In 1813 Saxony was the scene of Napoleon's struggle with the allies, and the battles of Lützen, Bautzen, Dresden, and Leipsic were followed by the Congress of Vienna (1814), when a large part of the dominions then under the Saxon monarch was ceded to Prussia. A period of great progress followed, interrupted somewhat at the revolutionary period of 1848-49. In the Austro-Prussian War of 1866 Saxony took part with Austria, and was occupied by the Prussian troops. Prussia desired to incorporate the kingdom, but Austria, supported by France, opposed this arrangement, and Saxony was admitted into the North German Confederation instead. In the Franco-German War Saxony united with the rest of Germany against France; and the present King Albert (then crown prince) was commander of the German army of the Meuse.

**Saxony, PRUSSIAN**, a province of the Prussian monarchy, of irregular shape, and with isolated districts, almost in the center of Germany, to the north of the kingdom of Saxony; area 9,729 sq. mi. Originally a part of Saxony, it was given to Prussia by the Congress of Vienna (1814). The northern and large portion belongs to the North German plain; the southern and southwestern is elevated or hilly, partly belonging to the Hartz Mountain system, and containing the Brocken (3,742 ft.). The chief river is the Elbe. The soil is generally productive, about 61 per cent. being under the plow and 20 per cent. forests. Beet sugar is largely produced. The mineral products are valuable, particularly lignite, salt, kainite, and other potash salts. The capital of the province is Magdeburg; other towns are Halle (with a university), Erfurt, and Halberstadt. Pop. 2,428,367.

**Saxton, JOSEPH** (1799-1873), inventor, b. in Huntington co., Pa. He invented a machine for cutting the teeth of watch wheels; made improvements in the construction of clocks; constructed a clock for the tower of Independence Hall, Philadelphia, a magneto-electric machine, and a locomotive differential pulley; superintended the construction of the machinery and balances for the Philadelphia mint; invented a deep-sea thermometer, a self-registering tide gauge, and an immersed hydrometer. He was a member of the American Philosophical Academy of Sciences.

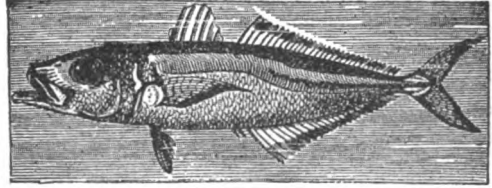
**Say, JEAN BAPTISTE LEON** (1826-96), French statesman and economist, b. at Paris. He was returned to the National Assembly in 1871, and in the following year became finance minister in the government of M. Thiers. He occupied this position in successive ministries; was appointed ambassador to London in 1880, and soon afterward was elected president of the senate. His chief economic works are *Histoire de la Caisse d'Escompte*; *La Ville de Paris et le Crédit Foncier*; and *Les Obligations Populaires*.

## Scale

**Sayce, ARCHIBALD HENRY, D. D., LL.D.**, (1846- ), English comparative philologist and Orientalist. He was educated at Bath and Oxford, where he became a fellow and tutor at Queen's College. In 1878 he was appointed deputy professor of comparative philology under Max Müller. He was a member of the Old Testament Revision Company, and was Hibbert lecturer (1887). He is the author of many works on philology and on Oriental languages, including *Principles of Comparative Philology*; *Introduction to the Science of Language*; *Ancient Empires of the East*; *Assyria, its Princes, Priests, and People*; *Assyrian Grammar*; *Lectures on the Origin and Growth of Religion*; etc.

**Scabbard Fish**, a beautiful fish found in the Mediterranean and Eastern Atlantic, so called because in shape it bears some resemblance to the sheath of a sword. It is of a bright silvery whiteness, with a single dorsal fin running along the back.

**Scad** (or Horse Mackerel), a genus of fishes included in the mackerel family and found around the coasts of Britain. It appears in



Scad.

large shoals, and the flesh, although coarse, is esteemed and eaten salted during the winter months.

**Scagliola** (skål-yi-ō'lä), a composition, imitative of marble, used for enriching columns and internal walls of buildings. It is composed of gypsum, or sulphate of lime, calcined and reduced to a fine powder, with the addition of water, by which a fine paste is made. While soft it is bestudded with splinters of spar, marble, granite, bits of concrete, colored gypsum, or veins of clay, in a semi-fluid state. It is smoothed with fine iron tools when soft, and when it becomes hard receives a high polish like marble.

**Scalds** (or Skalds), were the poets and historians of the Scandinavian race. They sang the praises of the gods and celebrated the exploits of the national heroes. A list of 230 of the most distinguished is still preserved in the Icelandic language.

**Scale**, in music, a succession of notes arranged in the order of pitch, and comprising those sounds which may occur in a piece of music written in a given key. In its simplest form the scale consists of seven steps or degrees counted upward in a regular order from a root or prime (the tonic or keynote), to which series the eighth is added to form the octave. It has been the practise among musicians to consider the scale having C for its keynote as the natural, model, or normal scale. The diatonic scale ascends by five steps (tones) and

## Scale Moss

two half steps (semitones), taking for the names of the notes the syllables do, re, mi, fa, sol, la, si, do; the two semitones occur between E and F (mi and fa) and B and C (si and do). When the scale is graduated all the way by a series of twelve half steps or semitones it is called the chromatic scale. A scale is said to be major when the interval between the keynote and the third above it, as from C to E, consists of two tones; it is called minor when the interval between the keynote and its third, as from A to C, consists of a tone and a half.

**Scale Moss**, a popular name given to the *Jungermannias*, plants resembling moss, and belonging to the order *Hepaticæ*. They grow on the trunks of trees, in damp earth, and in similar places, and are so called from the small scale-like leaves.

**Scales**, the imbricated plates on the exterior of certain animals, as the pangolins or scaly ant-eaters, serpents and other reptiles, and especially fishes. The scales of the latter are developed beneath the true epiderm, and consist of alternate layers of membrane, of horny matter, and occasionally of phosphate of lime. Fishes are sometimes classed, in accordance with the structure of their scales, into Ctenoid, Ganoid, Cycloid, and Placoid, the general appearance and character of which are well shown in the accompanying figures. The term scale is applied also in botany to a small rudimentary or metamorphosed leaf, scale-like in form and often in arrangement, constituting the covering of the leaf buds of the deciduous trees in cold climates, the involucre of the compositæ, the bracts of catkins, etc.

**Scal'iger** (skal'i-jér), JOSEPH JUSTUS (1540-1609), son of Julius Caesar Scaliger, b. at Agen in France. For some time he led an unsettled life, visiting Italy and England in his search for manuscripts. Having become a Protestant he retired from France after the massacre of St. Bartholomew, and was made professor in the Academy of Geneva, but returned to France in 1574, and lived there for the next twenty years. In 1593 he was appointed to the chair of polite literature in the University of Leyden, and remained there until his death. Of his numerous works the treatise *De Emendatione Temporum*, is one of the most important. In this work he gave the first complete and scientific chronological system.

**Scaman' der**, a small stream in the Troad, in the northwest of Asia Minor, associated with the little river Simois in the story of the Trojan war.

**Scam' mony**, a plant which grows abundantly in Syria and Asia Minor. It resembles the common bindweed, but is larger, and has a stout tap root, from which the drug scammony is extracted. This is the inspissated sap of the root, of a blackish gray color, a nauseous smell, and a bitter and acrid taste. It is used in medicine as a drastic purge, and usually administered in combination with other purgatives in doses of three or four grains.

**Scanderbeg** (1404-1467) (that is, *Alexander Bey*), prince of Albania, whose proper name

## Scansores

was George Castriota, son of John, prince of that country. At the age of eighteen he was placed at the head of a body of troops, but hearing of the death of his father Scanderbeg renounced Mohammedanism and raised the standard of insurrection in Albania. He repeatedly defeated the Ottoman forces, and Mohammed II found it necessary to accept terms of peace. After his death Albania again fell under Turkish dominion.

**Scandinavia**, the ancient name of the region now comprehending the three northern kingdoms, Denmark, Sweden, and Norway, or Sweden and Norway alone, and still not uncommonly used. These countries were inhabited in the earliest times by people of the Teutonic stock, and B.C. 100 the natives of Jutland and Schleswig became formidable to the Romans under the name of *Cimbri*. But it was chiefly in the ninth century that they made their power felt in the western and southern parts of Europe, where hordes of Northmen or Vikings, as they were sometimes called,

made repeated raids in their galleys on the coasts of England, Scotland, Ireland, Holland, Germany, France, Spain, and Italy, where they plundered, destroyed, and sometimes founded new states. The Old Norse or Scandinavian literature, so far as extant, is of considerable value, having

Scammony; a.—portion of root. preserved to us not only the old versification peculiar to all nations of Teutonic origin, but also the mythology, history, and laws of the pagan period of these northern countries. Among the most valuable remains are the *Edda* and the *Sagas*.

**Scanso' res**, an order of birds, popularly known as climbing birds, having the feet provided with four toes, of which two are turned backward and two forward. Of the two toes which are directed backward one is the hallux or proper hind toe, the other is the outermost of the normal three anterior toes. This conformation of the foot enables the scansores to climb with unusual facility. Their food consists of insects and fruit; their nests are usually made in the hollows of old trees. The most important families are the cuckoos, the woodpeckers and wry-necks, the parrots, the toucans, the trogons, the barbets, and the plantain eaters. Not all of this order are actually climbers, and there are climbing birds which do not belong to this order.



## Scape Goat

**Scape Goat**, in the Jewish ritual, a goat which was brought to the door of the tabernacle, where the high priest laid his hands upon him, confessing the sins of the people, and putting them on the head of the goat, after which the goat was sent into the wilderness, bearing the iniquities of the people.

**Scap'ula** (or Shoulder Blade), the bone which in most mammalia forms the chief bone of the shoulder girdle, and which chiefly supports the upper limb on the trunk or axial skeleton. In man the scapula exists as a flattened bone of triangular shape, which lies on each side of the body, on the back, and toward the upper and outer border of the chest or thorax.

**Scarabæ'us**, an extensive genus of coleopterous insects, placed by Linnaeus at the head of the insect tribes. They are sometimes called *dung-beetles*, from their habit of enclosing their eggs in pellets of dung, which are placed in holes excavated for their reception. The sacred beetle of the Egyptians was regarded with great veneration, and figures of it, plain or inscribed with characters, were habitually worn by the ancient Egyptians as an amulet. Large numbers of these scarabs, made of hard stone or gems, are still found in Egypt, often inscribed with hieroglyphics. Some of the carved scarabs are 3 or 4 ft. long. The beetle itself was also embalmed.

**Scarborough**, a municipal and parliamentary borough and seaport, England, county of York, is beautifully situated on the North Sea, 39 mi. n.e. of York. The main part of the town is south of this promontory and a deep valley divides it, and is bridged over from St. Nicholas Cliff to the South Cliff. There is a fine sea wall, forming an agreeable promenade, also a promenade pier on the north side of the town. The castle, which stands on the dividing promontory, was erected about 1136, and is a conspicuous object to the seaward. Scarborough carries on a limited foreign trade, principally with France, Holland, and the Baltic. Ship building, rope and sailcloth making, the manufacture of jet ornaments, and the fisheries give employment to many of the inhabitants. Pop. 33,776.

**Scar'broite**, a mineral of a pure white color, void of luster, and composed of alumina, silica, ferric oxide, and water, occurring as veins in the beds of sandstone covering the calcareous rock near Scarborough (whence the name).

**Scarificator**, an instrument used in scarification or cupping. It consists of ten or twelve lancets in a sort of box or case, which are discharged through apertures in its plane surface by pulling a kind of trigger, so that in passing they make a number of incisions in the part to which the instrument is applied.

**Scarlet Bean** (or Scarlet Runner), a twining plant, a native of Mexico, cultivated as a green vegetable for its long rough pods, or as an ornamental plant.

**Scarlet Fish**, a species of carp found in Chinese waters, and thus named because of its color. The eyes in these fish are exceedingly prominent, and the fins are double.

## Scharnhorst

**Scarpanto**, an island of the Mediterranean, 28 mi. s.w. of Rhodes, 27 mi. in length and about 6 broad. It contains quarries of marble and mines of iron, and has several harbors. Pop. 5,000.

**Scarron**, PAUL (1610-1660). French comic author, b. at Paris. After suffering from poverty he received a pension from the queen and one from Mazarin, but his hostility to the latter and his writings in favor of the *Fronde* lost him both patrons. He maintained himself, however, by working for the booksellers, and having at last received part of his paternal inheritance, he entertained at his house the brilliant literary society of Paris. In 1652, when almost wholly paralyzed, he married Françoise d'Aubigné, a young girl of considerable beauty, and afterward known as the famous Madame de Maintenon. Of Scarron's numerous writings the best is the *Roman Comique*; and of his plays *Jodelet* and *Don Japhet d'Arménie* have still considerable literary value.

**Schadow** (shā' dō), JOHANN GOTTFRIED (1764-1850), sculptor, b. at Berlin. He early showed a liking for the fine arts, and studied drawing and sculpture in his native city until he went to Italy, where he wrought from 1785 to 1787 in the museum of the Vatican and of the Capitol. His first great work was the monument erected in the Dorothea Church, Berlin, to the memory of the Count of the Mark, and this was followed by the colossal statue of Ziethen; the statue of Frederick the Great in Stettin; of Leopold of Dessau in Berlin; of Blücher in Rostock; the Tauenzein monument in Breslau; of Luther in Wittenberg, etc.

**Schaffhausen** (shāf' hou-zn), a town of Switzerland, capital of the canton of the same name, situated on the right bank of the Rhine, 24 mi. n. of Zürich. It is remarkable for the antique architecture of its houses. The principal edifices are the feudal castle of Unnot or Münst, on a height commanding the town; the parish or St. John's church; the minster or cathedral, built in 1052-1101, in the Romanesque style, with its ancient bell, made famous by Schiller and Longfellow. About 3 mi. below the town are the celebrated falls which bear its name, and by which the whole volume of the Rhine is precipitated over a height of more than 70 ft. Pop. 12,360. The canton is the most northerly in Switzerland, and is situated on the right or German side of the Rhine; area 116 sq. mi. The only river is the Rhine. The inhabitants are generally Protestants, and the language spoken is principally German. Pop. 38,348.

**Scharnhorst**, GERHARD JOHANN DAVID VON (1756-1813), Prussian general. He served in the Hanoverian army for a number of years, and then (in 1801) transferred his services to Prussia, where he rapidly rose in army rank, and was ennobled in 1804. After the humiliating Peace of Tilsit (1807), he was appointed president of the committee for the reorganization of the army, and it was by his system of short service that Prussia was so well prepared to declare war with France in 1813. In this campaign Scharnhorst accompanied Blücher



## Schaumburg Lippe

as lieutenant general and chief of the staff, and was mortally wounded.

**Schaumburg Lippe** (shoum'burk-lip-pé), a principality of the German Empire, in two detached portions; a northern, lying between Hanover, Hesse Cassel, and Rhenish Prussia, and a southern, between Lippe and Hanover; area 212 sq. mi.; pop. 37,204. The soil is fertile, corn is grown for export, and cattle are numerous. Schaumburg Lippe is a hereditary principality, with a constitution granted in 1868. The capital is Bückeburg.

**Scheele** (shā'lè), KARL WILHELM (1742-1786), Swedish chemist. He discovered tartaric acid, chlorine, baryta, oxygen, shortly after Priestley, glycerine, and arsenate of copper, called Scheele's green.

**Scheldt** (skelt), one of the most important rivers of Belgium and the Netherlands, rises in the French department of the Aisne; flows circuitously through Belgium; reaches Ghent, where it receives the Lys; at Antwerp attains a breadth of about 1,600 ft., and forms a capacious and secure harbor. About 15 mi. below Antwerp, shortly after reaching the Dutch frontier, it divides into the East and the West Scheldt, thus forming a double estuary. The whole course is 211 mi.

**Schelling** (shel'ing), FRIEDRICH WILHELM JOSEPH VON (1775-1854), a German philosopher, b. at Leonberg, Würtemberg. He studied at Tübingen, for a short time also at Leipsic, and from thence proceeded to Jena. His philosophical studies were mainly guided by Fichte, of whom he was first a colleague, and afterward successor. Schelling's system of philosophy, both in its earlier and later developments, was essentially pantheistic, but its later developments are marked by a strong eclectic tendency, which indicate the dissatisfaction of the speculator with his own results. The principle of identity—or of one absolute and infinite underlying both nature and spirit, real and ideal, objective and subjective—which he retained throughout, formed a link of connection between the most various systems, and afforded the utmost facilities for an eclectic development. He called his later speculation, based on mythology and revelation, positive philosophy, in contradistinction to his speculation on identity, which he called negative philosophy. The object of positive philosophy he defined as being not to prove the existence of God from the idea of God, but from the facts of existence to prove the divinity of the existent. The principal writings of Schelling are: *Ideas for a Philosophy of Nature*; *The Soul of the World*; *First Sketch of a System of the Philosophy of Nature*; *System of Transcendental Idealism*; *Exposition of My System of Philosophy*, published in the *Journal of Speculative Physics*, edited by him; *Bruno, or the Divine and Natural Principle of Things*; *Critical Journal of Philosophy* (in conjunction with Hegel); *Exposition of the True Relation of the Philosophy of Nature to the Amended Theory of Fichte*.

**Sheneck**, ROBERT CUMMING (1809-1890), was b. in Franklin co., O. He served in Congress

## Schiller

from 1843 to 1851; was appointed U. S. minister to Brazil in 1851, and made brigadier general of volunteers in the Civil War. In 1863 he was re-elected to Congress, and was sent as U. S. minister to England in 1871.

**Schenectady**, Schenectady co., N. Y., on Mohawk River, 17 mi. n.w. of Albany. Railroads: N. Y. C. & H. R.; D. & H. Canal Co.; and Erie Canal. Industries: electric works, two flouring mills, three knitting mills, and locomotive works. Surrounding country agricultural. The town was first settled in 1662 by a party of Dutch and became a city in 1798. Pop. 1900, 31,682.

**Scherer** (shā'rér), WILHELM (1841-1886), German scholar and historian of literature, b. at Schönborn, in Lower Austria; d. at Berlin. He studied at Vienna and Berlin, became professor of the German language and literature at Vienna, and then at Strasburg, and in 1877 went to Berlin as professor of modern German literature. His most important work was his *History of German Literature*, which has been published in English.

**Schiedam** (shē'dām), a town of the Netherlands, in the province of South Holland, near the right bank of the Maas, 4 mi. w. of Rotterdam. It is intersected by numerous canals, and its chief buildings are an exchange, a townhouse, a concert hall, a public library, and various hospitals. The staple manufacture is gin or Hollands, connected with which there are about 200 distilleries. Pop. 25,371.

**Schiller**, JOHANN FRIEDRICH CHRISTOPH VON (1759-1805), one of the greatest of German poets, was b. at Marbach, Würtemberg. His father, originally a surgeon in the army, was afterward a captain, and finally superintendent of the woods and gardens attached to a residence—the Solitude—of the Duke of Würtemberg. His first poem is said to have been written the day before his confirmation, in 1772. He had for several years received instruction at a Latin school in order to prepare him for the university; but at this time Charles, duke of Würtemberg, founded a school at the Solitude on a military-monastic plan, and offered to take young Schiller as one of the pupils. Here he studied jurisprudence; but when the school was removed to Stuttgart, and its scope became extended, Schiller turned his attention to medicine. When sixteen years old he published a translation of part of Vergil's *Aeneid*, in hexameters, in a Suabian periodical, and began an epic, the hero of which was Moses. He still continued his medical studies, however, for in 1780 he wrote an *Essay on the Connection of the Animal and Intellectual Nature of Man*, and in the same year was appointed physician to a regiment in Stuttgart. It was now for the first time that he had enough leisure and freedom to finish his tragedy of *Die Räuber* (*The Robbers*), begun three years previously. He published this piece at his own expense in 1781; it excited an immense amount of attention, and in 1782 it was performed at Mannheim. Arrested for attending the performance without leave of the Duke of Würtemberg, and forbidden to

## Schilling

write plays by the same despotic authority, Schiller fled from Stuttgart, was naturalized as a subject of the Elector-Palatine, and settled at Mannheim as poet to the theater. Here the plays of *Fiesco* and *Cabale and Liebe* were soon after produced. In 1785 he went to Leipsic and Dresden, where he studied the history of Philip II. In this way he prepared himself not only to write his drama of *Don Carlos*, which appeared in 1787, but also to publish a *History of the Revolt of the Netherlands*. Visiting Weimar in 1787 he received a friendly welcome from Wieland, Herder, and Goethe, the latter assisting to procure him a professorship of philosophy at Jena. Here he lectured on history, and began to publish *Historical Memoirs from the Twelfth Century to the Most Recent Times*; and his *History of the Thirty Years' War* appeared in 1790-93. It was now also that he returned with renewed ardor to poetry, and produced, particularly after 1795, his finest lyrical poems and ballads. From 1799 he lived in intimate acquaintance with Goethe at Weimar, and published in succession his dramas, *Wallenstein*, *Maria Stuart*, the *Maid of Orleans*, the *Bride of Messina*, and *William Tell*. He also adapted Shakespeare's *Macbeth*, Racine's *Phædra*, etc., for the stage, with which his dramatic works close. In 1802 he was raised to the rank of nobility.

**Schilling**, JOHANN (1828- ), German sculptor, b. at Mittweida, Saxony; studied art at Berlin and Dresden. In 1868 he became professor at the Dresden Royal Academy. His chief works include the *Four Seasons* at Dresden, Schiller's statue at Vienna, Maximilian's statue at Trieste, *War Memorial* at Hamburg, and the *German National Monument* on the Niederwald, opposite Bingen on the Rhine, with a colossal figure of *Germania*.

**Schleswig-Holstein**, since 1866 a province of Prussia, bounded on the n. by Denmark; e. by the Baltic, Lübeck, and Mecklenburg; s. by Mecklenburg and the territory of Hamburg; s.w. by the Elbe; and w. by the North Sea; area 9,273 sq. mi. Schleswig is the portion lying north of the Eider; Holstein that south of this river. Schleswig-Holstein forms part of the same peninsula with Jutland, to which in its general character it bears considerable resemblance. There are extensive moorlands; the west coast consists of sandy and marshy flats, protected in Schleswig by chains of islands, in Holstein by lofty dikes; the east coast is scooped out into natural harbors; the principal streams flow to the west, toward which for the most part the country slopes. Schleswig is separated from Holstein by the Eider and the Schleswig-Holstein Canal. Pop. 1,217,437.

**Schley**, WINFIELD S., Rear-Admiral, was born at Frederick, Md., October 9, 1839. He entered the U. S. Naval Academy at the age of 17 and was graduated in 1860. In 1860 he served on the *Niagara* which was sent to convey the Japanese embassy to their country. He won a lieutenantancy in 1862, but Schley's most signal performance was his discovery of Lieutenant Greely in the far north. Greely

## Schlosser

went north with his expedition in 1881 and was not heard from for two years. Commander Schley volunteered his services as head of the relief expedition which set sail in April, 1884. The expedition was successful and Greely and the remnant of his expedition were brought away in safety. In the war with Spain he was attached to Sampson's command and was in temporary charge of the fleet on the 3rd of July, 1898, when Admiral Cervera's fleet came out of Santiago harbor and was destroyed. Pl. 14, Vol. II.

**Schley Court of Inquiry**.—A number of statements derogatory to Admiral Schley's conduct during the Spanish-American War having been made by officers of the navy, and the publication of *Macloy's History of the American Navy*, in which he was accused of cowardice, led him to request the Secretary of the Navy to have these charges investigated. In accordance with this request a court of inquiry consisting of Admiral Dewey as president and Rear-Admirals Benham and Ramsey was called to meet in Washington, Sept. 12, 1901. The court rendered its decision on Dec. 13th. The conduct of Schley in the battle with Cervera's fleet was commended, but his management of what was known as the flying squadron previous to this battle was censured. Admiral Schley appealed from the decision, first to the Secretary of the Navy, and finally to the President. Both sustained the verdict of the court.

**Schliemann** (shlē'mān), HEINRICH (1822-1890), German archaeologist. He traveled widely and acquired many languages, and having made a fortune commenced a series of archaeological investigations in the East. In 1869 he published at Paris his *Ithaque, Le Péloponnèse, Troie, Recherches Archéologiques*, an account of his travels in these regions, and this was followed in 1874 by his *Trojanische Alterthümer*, giving the results of his researches and excavations on the plateau of Hissarlik, the alleged site of ancient Troy. In 1875 he commenced excavations at Athens and Mycenæ, and in 1877 discovered the five royal tombs which local tradition in the time of Pausanias asserted to be those of Agamemnon and his companions. Many treasures of gold and silver were brought to light. His *Mycenæ*, a narrative of researches and discoveries of Mycenæ and Tiryns, was published in 1877, with a preface by Gladstone. He received valuable assistance in his investigations from his wife, who is a native of Greece and an accomplished scholar. His *Troja* and his *Tiryns* are in a measure supplementary to his earlier works on Troy and Mycenæ.

**Schlosser** (shlos'ér), FRIEDRICH CHRISTOPH (1775-1861), a German historian. He was educated at Göttingen, in 1812 was appointed professor in the newly founded lyceum of Frankfurt, and when it ceased to exist in 1814 he became city librarian. In 1817 he was called as professor of history to Heidelberg. His first great historical work, the *History of the World* in a connected narrative, was followed in 1823 by his *History of the Eighteenth Century*, which in its subsequently enlarged form won him yet

wider fame. His other works include a *View of the History of the Old World and its Civilization* and a *History of the World for the German People*. Along with Bercht he edited the collection of *Archives for History and Literature*.

**Schmalkalden** (schmäl'käl'den), a town in the province of Hesse-Nassau, Prussia, at the junction of the Stille and Schmalkalde, 18 mi. southwest of Gotha. It is an ancient town, noted in the sixteenth century as the meeting-place of the Schmalkaldic League (which see). In 1866 it passed with Hesse-Cassel to Prussia. It is an iron and steel manufacturing center. Among the objects of interest are the Luther fountain, fifteenth century Gothic church with a famous organ, the double city walls, ancient courthouse and castle. Pop. 1900, 8,726.

**Schmalkaldic League**, a league entered into at Schmalkalden in 1531 by several Protestant princes and free cities for the common defense of their faith and political independence against the Emperor, Charles V. Among the organizers were John the Constant, Elector of Saxony, his son John Frederick, and Philip, Landgrave of Hesse. The rulers of Saxony were empowered to manage its affairs. In the war of the Schmalkaldic League against Charles V (1546-47), Charles was at first successful. In his victories he was aided by Maurice of Saxony, who had been a member of the Schmalkaldic League, but, tempted by the promise of the Electorate of Saxony, had gone over to the side of the Emperor. At Mühlberg, Apr. 24, 1547, the Protestant forces were totally routed and both the Elector and Philip of Hesse fell captive to the Emperor. At this juncture, however, Maurice deserted the Emperor and, returning to his former allegiance, organized a revolt. Making an alliance with Henry II of France, he led the League again into the field and by several successive victories forced the Emperor to grant the Treaty of Passau, guaranteeing absolute freedom of worship to the Protestants. See *Reformation, Protestant*.

**Schnorr von Karolsfeld**, JULIUS (1794-1872), German painter, b. at Leipsic. His father was also a painter of some note. From 1817 to 1827 he resided in Italy, and was then invited by Ludwig, king of Bavaria, to Munich, where he became professor of historical painting in the Academy of Fine Arts. His frescoes in illustration of the *Nibelungenlied*, and of the lives of Charlemagne, Frederick Barbarossa, and Rudolph of Hapsburg, at Munich, are among the most famous of modern works of this class. While at Dresden he completed his *Illustrations of the Bible*, which were engraved and published under the title of *Die Bibel in Bildern* (240 plates, large 4to, Leipsic, 1852-60). These have been published in Great Britain, with descriptive English text. To the Dresden period also belong the oil painting of *Luther at the Diet of Worms*, and the designs for a window for St. Paul's, London.

**Schöffer** (sheuf'er), PETER (1420-1502), an early printer, b. at Gernsheim, near Darmstadt; educated at the University of Paris.

where he was a copyist in 1449; removed to Mainz in 1450, and married the daughter of Johann Fust. He is credited with having perfected the art of printing by devising an easier mode of casting type.

**Schofield**, JOHN McALLISTER, soldier, was b. in Chautauqua co., New York, in 1831. In 1853 he graduated at West Point, and at the opening of the Civil War entered the service as major of the First Missouri Volunteers. In 1861 he was appointed brigadier general, and afterward was in command of the Missouri militia. His service to the Union was inestimable. In 1868 he was appointed secretary of war to succeed Edwin M. Stanton, and in 1869 was made major general of the U. S. Army, and later general in chief with headquarters at Washington. He was appointed lieutenant general by President Cleveland in 1895, but retired the same year.

**Scholasticism**, the name given to the system of philosophy taught by the philosophers of the Middle Ages, who were called *scholastics* or *schoolmen* from the circumstance that their philosophy originated in the schools instituted by and after Charlemagne for the education of the clergy. The philosophy here taught consisted in a collection of logical rules and metaphysical notions drawn from the Latin commentators on Aristotle, and from the introduction of Porphyry to the writings of Aristotle. The character of the scholastic philosophy, however, varied considerably at different periods. In general it was a fusion of Christianity and Aristotelian logic. In its later stages, it might be defined as being an effort to reconcile revelation and reason, faith and philosophy. Viewed in this light, it was not altogether unlike that theological philosophy of the present day whose aim is to harmonize the Bible with the facts of modern science.

The philosophers and divines who engaged in these speculations are known as schoolmen. St. Augustine was one of the first to attempt to interpret the facts of science and the theories of Greek philosophy in the light of Christian revelation. He was followed by Saint Anselm, Albertus Magnus, Roger Bacon, Duns Scotus and Thomas Aquinas. In the thirteenth century, under the influence of the most eminent of the schoolmen, Thomas Aquinas, called the "Angel of the Schools," scholasticism reached its highest development. Aquinas' remarkable work, entitled *Summa Theologica*, ably outlines and defends the whole scheme of Roman Catholic theology.

Though the schoolmen at times busied themselves with unprofitable questions in metaphysics and theology, yet their discussions were not without good results. Their debates sharpened the wits of men, stimulated activity of thought and created skill in argument. The schools of the time became real mental gymnasiums, where the young awakening mind of Europe received its first training and gained its earliest strength. It should be noted that closely related to the subject of scholasticism is the history of the universities, which, springing up in the thirteenth



## Schomberg

century, became a powerful agency in the revival of learning. They were for the most part expansions of the old cathedral and abbey schools, which, through the reputation of the schoolmen, drew such multitudes to their lectures that it became necessary to make new and more extensive provisions for their accommodation.

During the nineteenth century there has been a tendency among a number of scholars of Germany, France, Italy, Spain, and England to revise the scholastic teachings. A strong impulse to this scholastic movement was given by Pope Leo XIII in many public utterances, notably by his encyclical *Aeterni patris* (1879), in which he urges a return to the study of the great schoolmen, not with a view to the wholesale reestablishment of scholasticism in its medieval aspect, but with the idea of its extension, completion and adaptation to the intellectual requirements of the present age. To this end a critical edition of the works of St. Thomas is now being published at Rome under Papal auspices, and the *Institut Supérieur de Philosophie* has been established at Louvain under the presidency of M. Mercier.

**Schomberg** (shom'berg), **FREDERICK HERMANN, DUKE OF** (1619-1690), a distinguished soldier, a native of Germany. He commanded the French army in Catalonia in 1672, and was afterward employed in the Netherlands, where he obliged the prince of Orange to raise the siege of Maestricht. For these services he was created a marshal of France in 1675; but on the revocation of the Edict of Nantes Marshal Schomberg, who was a Protestant, quitted the French service, and took service under the elector of Brandenburg. He went to England in 1688 with William III, and after the revolution was created a duke.

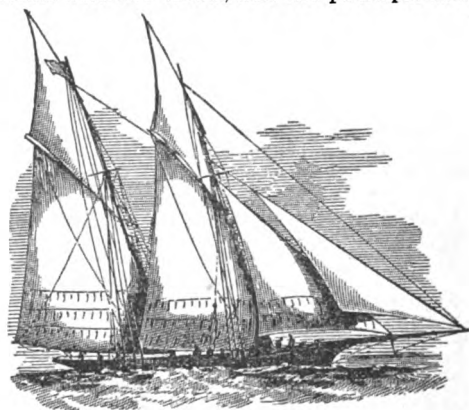
**Schomburgk** (shom'bürk), **SIR ROBERT HERMANN** (1804-1865), traveler, son of a German Protestant clergyman. He engaged in commercial pursuits, came to America, then to the West Indies, and gained the patronage of the Royal Geographical Society of London by a report on the island of Anegada, in the West Indies. From 1835 to 1839 he was engaged in the exploration of Guiana, a commission undertaken at the instance of the Royal Geographical Society of London. Returning to England in 1839, he received the gold medal of the Royal Geographical Society for a work entitled *Travels and Researches during the Years 1835-39 in the Colony of British Guiana*, etc. In 1840 he was sent to make a survey of British Guiana for the government, and in 1844 received the honor of knighthood for his services. In addition to the works already alluded to he wrote a *Description of British Guiana*, a *History of Barbadoes*, and other works.

**Schoolcraft**, **HENRY ROWE** (1793-1864), an ethnologist and geologist, b. in Watervliet (now Guilderland), in Albany co., New York. He was educated at Union and Middlebury colleges, and in 1816 commenced an unfinished serial work on glass making, entitled *Vitreology*. In 1817-18 he made a journey to the West, with the object of extending his knowl-

## Schooner

edge of geology and mineralogy, and on his return published *A View of the Lead Mines of Missouri*, etc. In 1820 he was appointed geologist to the expedition dispatched by the government to explore the sources of the Mississippi, and in 1821 was appointed secretary to an Indian conference at Chicago. In 1822 he was appointed agent for Indian affairs in the northwestern provinces, and having married a lady of Indian descent, devoted himself to the investigation of the languages, ethnology, and antiquities of the Indians. From 1828 to 1832 he was a member of the territorial legislature of Michigan. In 1832 he conducted a government expedition to the Upper Mississippi, in the course of which he explored the sources of that river. In 1836 he negotiated the purchase for government of 16,000,000 acres in this region, and after this he was appointed acting superintendent of Indian affairs for the northern department. In 1847 he was appointed by the government to prepare an extensive work on the Indians, which appeared under the title of *Historical and Statistical Information Respecting the History, Condition, and Prospects of the Indian Tribes of the U. S.* (1851-57). Besides the works already mentioned we have from his prolific pen *Algonic Researches, Comprising Inquiries Respecting the Mental Characteristics of the North American Indians; Thirty Years with the Indian Tribes of the Northwestern Frontier; The Indian in His Wigwam; and the Myth of Hiawatha and Other Legends*; besides poems, lectures, reports, etc. For his *Lectures on the Indian Languages* he received the gold medal of the French Institute. Schoolcraft married a second time in 1847. He d. at Washington.

**Schooner**, a small fast-sailing sharp-built vessel with two masts, and the principal sails



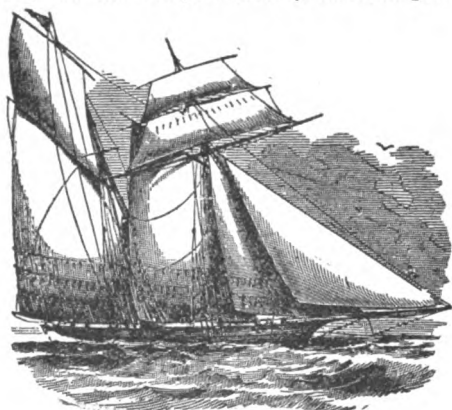
Fore-and-aft Rigged Schooner.

of the fore-and-aft type. There are two chief kinds of schooners, the topsail schooner and the fore-and-aft schooner, the former carrying a square topsail and topgallant-sail (with sometimes a royal) on the foremast, and the latter having fore-and-aft-sails on both masts, with sometimes a square sail on the foremast. The first schooner is said to have been launched

## Schopenhauer

at Gloucester, Mass., in 1713. A three-masted schooner carries fore-and-aft-sails on each mast.

**Schopenhauer** (shō'pen-hou-ér), ARTHUR (1788-1860), a German philosopher, b. at Dantzic. He graduated at Jena in 1813 with an essay on the *Fourfold Root of the Principle of*



Topsail Schooner.

*Sufficient Reason*, in which he lays down the basis of his future system. From 1814 to 1818 he lived at Dresden, and occupied himself principally with the preparation of his most important work—*The World as Will and Idea*. Previous to this he had published a work on optics. In 1818 he visited Rome and Naples, and from 1822 to 1825 was again in Italy, returning in the latter year to Berlin. Here as a private lecturer he met with little success, and on the outbreak of cholera in 1831 he left the capital and spent the remainder of his life in private at Frankfort-on-the-Main, devoting himself to the elaboration of his system. The philosophical system of Schopenhauer has for its fundamental doctrine the proposition that the only essential reality in the universe is *will*, in which he includes not only conscious desire, but also unconscious instinct, and the forces which manifest themselves in inorganic nature. What are called appearances exist only in our subjective representations, and are merely forms under which one universal will manifests itself. Between this universal will and the individuals in which it appears there are a number of ideas, which are stages in the objectivication of the will. Throughout nature, from the lower animals downward, the will works unconsciously, and it only attains consciousness in the higher stages of being, as man. All intelligence serves originally the will to live. In genius it is emancipated from this servile position, and gains the preponderance. Upon this foundation Schopenhauer rears his æsthetic and ethical structures; the former of which derives much from the Platonic system, while the latter resembles in maintaining the necessity of entirely subduing the sensuous nature in man, without determining positively the true end of spiritual life, the Buddhist doctrine of Nirvana. The final teach-

## Schumann

ing of Schopenhauer is, therefore, that of a philosophic pessimism, having as its ideal the negation of the will to live.

**Schottische** (shot-tish'), a dance performed by a lady and gentleman, somewhat resembling a polka; it is  $\frac{3}{4}$  time.

**Schubert** (shö'bert), FRANZ (1797-1828), one of the greatest composers of modern times, b. at Vienna, the son of a teacher; commenced his musical education in his seventh year, and in 1808 was admitted among the choristers of the court chapel. He soon acquired particular efficiency on the piano and the different stringed instruments, so that in a short time he was able to take the part of first violin in the orchestra. After he left the court chapel he supported himself by teaching music, devoting himself in obscurity and neglect to original composition. He achieved success in almost all kinds of music, but his genius was specially noteworthy for its opulence in melody and lyric power. His songs and ballads, as exemplified in his three principal collections, the *Winterreise* (1826-27), the *Müllerlieder* (1828), and the *Schwanengesang* (1828), may be said to have revolutionized the *Lied* in making the accompaniment not less interpretative of the emotions of the poem than the vocal part, and in breaking through the limitations of the old strophic method. Besides his six hundred songs he left about four hundred other compositions, including fifteen operas, six masses, and several symphonies. Two only of the operas, *Rosamond* and the *Enchanted Harp*, were performed during his life, and they are considered inferior to his unproduced *Fierabras*. His symphonies take a higher rank, the *Seventh* (in C major) being ranked by Mendelssohn and Schumann with Beethoven's. His entire work justifies Liszt's description of him as the most poetic of musicians.

**Schumann** (shö'män), ROBERT (1810-1856), musical composer and critic, b. at Zwickau in the kingdom of Saxony. He studied law at Leipzig, but in 1830 finally devoted himself to music under the tuition of Friedrich Wieck and Heinrich Dorn. The daughter of the former, the celebrated pianiste, Clara Wieck (b. 1819), became his wife in 1840. In 1834 he commenced his *Neue Zeitschrift für Musik*, a journal which was to herald an ideal music, and which, for the ten years of his more intimate connection with it, exercised an important influence upon the development of the art. Prior to 1840 his principal works were the *Fantasias*, the *Scenes of Childhood*, the *Etudes Symphoniques*, the *Kreisleriana*, the *Abegg variations*, the *Papillons*, the *Carnival*, and two sonatas in F sharp minor and G minor. In the year following his marriage he published nearly one hundred and fifty songs, many upon Heine's words, and all marking an advance upon previous composers in the fidelity and subtlety with which they reproduced the most delicate shades of meaning in the poems selected for musical treatment. He then commenced his great series of orchestral works, his symphony in B flat being first performed at the close of 1841. It was followed by his *Overture Scherzo*

and *Finale*, his D minor symphony, three quartets, the piano quintet and quartet, the cantata *Paradise and the Peri*, the C major symphony, *Genevieve*, *Manfred*, the *Faust* music, the E flat symphony, and other works. Under stress of work, however, his reason failed him, and after an attempt to drown himself in 1854 he was confined in a lunatic asylum, where he died. In the line of musical descent Schumann stands between Beethoven and Wagner.

**Schurman**, JACOB GOULD (1854—), President of Cornell University; b. at Fredericton, Prince Edward Island, May 22, 1854; educated in Canada, and England and Germany. He became professor of philosophy in Cornell University in 1886 and president in 1892, succeeding Andrew D. White. He was made chairman of the first Philippine commission appointed by President McKinley. Dr Schurman is editor of *The Philosophical Review* and has been editor of *The School Review*. He is author of *Kantian Ethics and the Ethics of Evolution*, and of numerous essays and addresses.

**Schuykill** (sköl'kil), a river in Pennsylvania, which rises in the north side of the Blue Mountains, runs southeast, passes through the confines of Philadelphia, and unites with the Delaware 5 mi. below that city. It is 120 mi. long, and navigable for boats of 300 or 400 tons to Philadelphia.

**Schwanthaler** (shvân'tä-lér), LUDWIG MICHAEL (1802-1848), a German sculptor, b. at Munich. In 1835 he was made professor in the Academy of Arts in Munich. Among his more important works may be specified the fifteen figures of the *Battle of Arminius*, for the northern pediment of the Walhalla; the colossal bronze statue of Bavaria, 70 ft. high, in front of the Ruhmeshalle, Munich; and a statue of Mozart for Salzburg.

**Schwarzburg-Rudolstadt** (shvârts'byrñ-rö-dol-stât), a German principality, consisting of several isolated portions, situated between Prussian Saxony, the Saxon duchies, and the principality of Reuss. It lies on the northern side of the Thuringian Forest, and has an area of 362 sq. mi. The most important crop is flax, the culture of which is almost universal. A great part of the land is devoted to pasture, and great numbers of cattle are reared. The minerals include brown coal, iron, slate, and salt. The principal manufactures are glass and porcelain. The inhabitants are almost all Lutherans. Capital Rudolstadt; pop. 83,836.

**Schwarzburg-Sondershausen**, a German principality on the northern side of the Thuringian Forest, between the territories of Prussian Saxony and the Saxon duchies, and consisting of several distinct portions; area 332 sq. mi. It is more fertile than Schwarzburg-Rudolstadt, producing corn for export. One of the principal sources of revenue is derived from the forests, which furnish excellent timber. Flax also is extensively cultivated, and great numbers of cattle, sheep, and swine are reared. The only manufacture of any importance is porcelain. The inhabitants are almost all Lutherans. Capital Sondershausen; pop. 73,606.

**Schwarzenberg**, FELIX LUDWIG JOHANN FRIEDRICH, PRINCE OF (1800-1852), an Austrian statesman. In 1824 he went to St. Petersburg as an attaché to the embassy, and was subsequently employed in connection with the embassies at London, Brazil, Paris, Berlin, Turin, Parma, and Naples. Returning to Vienna from Naples in 1848 he re-entered the army, but soon after, on the suppression of the popular rising in Vienna, he was called to be the head of the new government. His great object was to govern Austria as a single state in a military and absolute manner—still not without some inclination to internal reforms; and to establish the preponderance of the Austrian power in Germany and Central Europe; and this, after the suppression of the Hungarian revolt, he largely succeeded in doing.

**Schwarzenberg**, KARL PHILIPP, PRINCE OF (1771-1820), Austrian field marshal, b. at Vienna, served in the early wars of the French Revolution, taking part in the battles of Würzburg, Ulm, Austerlitz, and Wagram. He negotiated the marriage between Napoleon and Maria Louisa. In the campaign of 1812 he commanded the Austrian auxiliary corps in Galicia, and at the close of the year received the staff of field marshal general. After Napoleon's return from Elba he commanded the allied forces on the Upper Rhine, and though the contest was decided at Waterloo without his participation, he took part in the subsequent movement upon Paris.

**Schweidnitz** (shvî't'nîts), a town of Prussia, in Silesia, on a height above the Weistritz, 29 mi. s.w. of Breslau. Its manufactures include machinery, woollens, linens, furniture, earthenware, carriages, gloves, beer, and spirits. It was made a regular fortress by Frederick the Great, and figured much during his wars. Pop. 23,669.

**Schwerin** (shvâ-rēn'), the capital of Mecklenburg-Schwerin, on the western shore of the lake of same name and other smaller lakes, 60 mi. e. of Hamburg. The manufactures consist of machinery, carriages, woolen and linen cloth, lacquer and earthenware, etc. Pop. 33,643.

**Schwyz** (shvêts), a central canton of Switzerland, bounded on the n. by the Lake of Zürich and canton St. Gall, w. by Zug and Luzern; s. by Lake Luzern, and e. by Glarus; area 353 sq. mi. The chief industry is the rearing of cattle, sheep, and swine. The canton is very poor in minerals. Manufactures are almost confined to some cotton and silk spinning and weaving. Schwyz being the most important of the cantons which first threw off the yoke of Austria, gave the name to the whole confederation. Its present government is an extreme democracy, the whole power, legislative and executive, being lodged in the male population of legal age, who hold a general assembly every two years. Pop. 50,307.

**Sciences**, a term applied to the generalized and systematized divisions of knowledge. Science and philosophy resemble each other in so far as they both have to do with knowledge;



but while the latter deals with the whole sum of knowledge, the former takes up special branches of it, and it does not necessarily go back to first principles like philosophy. Given a sufficient number of inter-related facts, they may be so arranged and classified, by referring them to the general truths and principles on which they are founded, as to constitute a well-certified and more or less complete branch of knowledge, that is, a science. The sciences are broadly divided into pure or theoretic sciences and applied or practical sciences, the latter being definable as the knowledge of facts, events, or phenomena as explained, accounted for, or produced by means of powers, causes, or laws; the former as the knowledge of these powers, causes, or laws, considered apart or as pure from all applications. To the class of pure or fundamental sciences belong mathematics, physics, chemistry, psychology, and sociology; to the applied or concrete belong geology, mineralogy, botany, zoology, meteorology, geography, ethics, politics, law, jurisprudence, logic, grammar, rhetoric, philology, and political economy; navigation, engineering, and practical mechanics; surgery, midwifery, *materia medica*, etc.

**Scilly Islands** (sil'i), a group of granitic islands belonging to England, forming part of the county of Cornwall, at the entrance to the English Channel, about 30 mi. w. by s. of Land's End. There are only six of any importance, the remainder being mere rocks and islets. The climate is warm and moist, and large quantities of early vegetables and spring flowers are raised for the London market.

**Scio** (or Skio) (si'ō; skē'ō) (ancient *Chios*), an island of Asiatic Turkey, in the Ægean Sea, separated from the coast of Asia Minor by a channel not more than 7 mi. wide where narrowest, and about 53 mi. w. off Smyrna. The principal products are wine, oil, cotton, silk, oranges, and other fruits, and more especially mastic. The quantity of cereals is very limited. Pop., of whom a large portion are Turks, about 70,000. Before the war of Greek independence Scio was peopled almost entirely by Greeks, of whom large numbers were massacred by the Turks after their subjugation in 1822. Scio contends for the honor of having given birth to Homer.

**Scio'to**, a river of Ohio. Its general course is south, its length about 280 mi., and it flows into the Ohio River by a mouth 150 yards wide at Portsmouth. It is navigable for boats about 130 mi. Its valley is one of the richest and best cultivated portions of the state.

**Scip'io Africa' nus**, THE ELDER (PUBLIUS CORNELIUS SCIPIO AFRICANUS MAJOR) (235-183 B.C.), one of the most illustrious of Roman warriors. At the battle of the Ticinus against the Carthaginians in 218 B.C. he is said to have saved the life of his father. Two years later he was one of the few who escaped from the fatal battle of Cannæ, when he succeeded in gathering together the remains of the defeated army and saving Rome. In 212 B.C. he was unanimously elected ædile, and a few years after was appointed proconsul in Spain. His

first successful enterprise of importance was the conquest of New Carthage, the stronghold of the Carthaginians in Spain. The next year (209 B.C.) Scipio totally defeated Hasdrubal, Hannibal's brother, and subsequently a fresh army, led by Mago and Hasdrubal the son of Gisco. The result was to drive the Carthaginians wholly from Spain, and Scipio was empowered to lead an army against Carthage herself. The Carthaginians recalled Hannibal from Italy, but the great battle of Zama, fought Oct. 19, 202 B.C., resulted in the total defeat of the Carthaginians, who, on the advice of Hannibal, sought for peace. On his return to Rome Scipio was honored with a triumph, and received the surname of *Africanus*. After the successful close of the war with Antiochus, king of Syria, in B.C. 189, Scipio retired into private life. He died, it is believed, the same year as his great opponent Hannibal.

**Scip'io Africa' nus**, THE YOUNGER (PUBLIUS CORNELIUS SCIPIO ÆMILIANUS AFRICANUS MINOR) (187-129 B.C.), son of L. Æmilius Paulus, the conqueror of Macedonia, and adopted son of P. Cornelius Scipio, the son of Scipio Africanus Major. In B.C. 152 he accompanied the consul Lucius Licinius Lucullus to Spain as military tribune, and in B.C. 149, on the outbreak of the Third Punic War, commanded in Africa under the consul M. Manlius Nepos. His services were so important that in B.C. 147, contrary to the usual custom, not being of the legal age, he was unanimously chosen consul and leader of the forces against the Carthaginians. In B.C. 146 he took, and by command of the senate burned Carthage, for which he was honored with a triumph at Rome and with the surname of *Africanus*. In the last years of his life he made himself many enemies among the people by opposing the measures of the popular party, and especially the agrarian law of Tiberius Gracchus, of which Papirius Carbo, and C. Gracchus, the tribunes of the people, were the great supporters. He was found dead in his bed in B.C. 129, Carbo being suspected of having murdered him. He was a friend of Polybius, the historian, and a patron of Terence.

**Scissor Bill**, a genus of *Laridæ* or gulls, so named from the possession of an elongated beak of compressed form, the lower mandible exceeding the upper one in length, and shutting into the latter somewhat after the fashion that the blade of a knife does into its handle. This curious beak is of an orange color at its base, and black at its tip. The bird, which inhabits the coasts of America and Africa, is a dark brown on the upper aspect of the head and body; the under surface white, and a band of white across the wings. The average length of the scissor bill is about 1½ ft.

**Scoresby**, WILLIAM (1789-1857), an Arctic navigator, born at Cropton, in Yorkshire. He made his first voyages with his father, a daring and successful commander in connection with the northern whale fishery, to whom he latterly acted as chief mate. On the resignation of his father in 1811 he was appointed to

## Scorpion

succeed him as captain of the *Resolution*. Through information communicated by him to Sir Joseph Banks, the government was induced in 1817 to fit out an expedition under Sir John Ross, to discover the northwest passage. In 1820 Captain Scoresby published a work entitled *An Account of the Arctic Regions, with a History and Description of the Northern Whale Fishery*, which established his reputation as one of the most original observers and scientific navigators of the day. Throughout his life he had a keen interest in scientific investigation, especially in that of magnetism and its relation to navigation.

**Scorpion**, the name of animals of the class Arachnida (which includes also the spiders)—the largest of their class. Scorpions have an elongated body, suddenly terminated by a long slender tail formed of six joints, the last of which terminates in an arcuated and very acute sting, which effuses a venomous liquid. This sting gives rise to excruciating pain, but is usually unattended either with redness or swelling, except in the glands of the arm-pit or groin. It is very seldom, if ever, fatal to man. The eyes, which are of the simple kind, number six, eight, or twelve. The female scorpions are said to exhibit great care for their young, and carry them on their backs for several days after being hatched, while they tend them carefully for about a month, when they are able to shift for themselves. Scorpions generally live in dark places, and under stones. They are found in the south of Europe, in Africa, in the East Indies, and in South America, several genera being comprised within the order. The rock scorpion of Africa is one of the most familiar species. The scorpions are first represented in a fossil state in the carboniferous period. The book scorpions are so named from their presenting a close resemblance in outward form to the true scorpions. They are, however, very much smaller, and are included in another group, while they



Common Scorpion.

want the jointed tail of the true scorpions. They are generally found living among old books, and feed on the minute insects which also inhabit such situations.

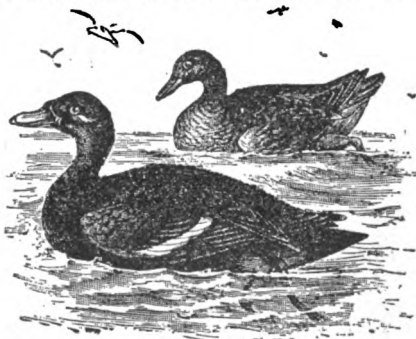
**Scorpion Fish** (or Sea Scorpion), a genus of fishes belonging to the gurnard family. The first dorsal fin possesses eleven spines, the second dorsal possessing one spiny ray and nine or ten soft rays. The anal fin is short, and has three

## Scotland

spines and five soft rays. The red scorpion fish is a familiar form. The spotted scorpion fish is a second species, and, like the preceding form, occurs in British waters, as well as in the Mediterranean, Atlantic, and the tropical seas.

**Scorpion Fly**, a genus of insects belonging to the order Neuroptera, or that of the dragon flies. The name scorpion fly is derived from the appendages seen attached to the abdomen of some species. The male in the common species, for example, has the sixth and seventh joints of the abdomen attenuated, and capable of extensive motion, while the last joint forms a pair of forceps resembling those of the earwigs. When at rest this tail is curled over the back, but when irritated the forceps are used as weapons of offense or defense.

**Scoter** (or Surf Duck), a genus of sea ducks. The most familiar species is the common or



Velvet Scoter.

black scoter, which shows a deep black plumage in the male, the bill and legs being of the same color. The upper mandible is marked on its dorsal surface by a line of orange color. This bird averages the common duck in size; and the females are colored a dark-brown hue. It occurs in the Arctic regions in summer. An American species of coot is known as surf duck.

**Scotland**, the northern division of the island of Great Britain, between lat. 54° 38' and 58° 40' 30" n.; and lon. 1° 46' and 6° 8' 30" w. It is separated from England substantially by the Solway, Cheviots, and Tweed, the border isthmus being about 60 mi. across; but the irregular boundary line measures fully 100 mi. On all other sides it is bounded by the sea. The greatest length from n.e. to s.s.w., is 287 mi. The breadth varies from 149 mi. to less than 30, the latter in the north, between Dornoch Firth and Loch Broom. Few points in the mainland are more than 40 mi. from the sea, the country being so much penetrated by inlets. The country was formerly divided into a number of districts, many of the names of which are still familiar, such as Lothian, Tweeddale, Galloway, Breadalbane, etc., but for political purposes it is now divided into 32 shires or counties, having a total area of 30,367 sq. mi., and a total pop. 1901, of 4,471,957.

Four towns, Edinburgh (the capital), Glasgow, Dundee, and Aberdeen, each contain upward

## Scotland

of 100,000 inhabitants. Among the more important of the other towns are Greenock, Paisley, Perth, Inverness, Stirling, Kilmarnock, and St. Andrews.

*Islands and Coasts.*—The islands of Scotland are said to number altogether nearly 800. On the east coast they are few and small; but on the northeast are the two large groups of the Orkneys and Shetlands, the former numbering 52 islands, 28 permanently inhabited; the latter 100 islands, 29 inhabited; while on the west coast the islands are large and numerous. Here the Hebrides extend for 200 mi. from north to south, and are divided into the *Inner* and *Outer Hebrides*, the former lying close to the western coast of the mainland and stretching from Skye to Islay; the latter, parted from the Inner Hebrides by the straits of the Minch and the Little Minch, comprise the long chain of islands from Lewis to Benbecula. Enclosed in the Firth of Clyde are the islands of Arran, Bute, and the Cumbraes, forming a county by themselves. The west of the mainland is generally a wild, deeply indented mountain wall, presenting a series of inlets or sea lochs, while toward the middle the coast is cleft by two great inlets with openings to the southwest, the Firth of Lorn and its continuation Loch Linnhe, and the Firth of Clyde and its ramifications running far inland. The east coast is sometimes low and sandy, but is often formed of steep rocky cliffs of considerable elevation, the chief inlets being the Firths of Forth and Tay, and the Moray Firth, Cromarty Firth, etc.

*Surface.*—Both from the configuration of the surface and the geological structure, the country divides into three divisions, the Highlands, Central Lowlands, and Southern Uplands. The first of these divisions lies north of a line stretching in a southwestern direction from the coast of Kincardineshire to the Firth of Clyde; the third is the country south of a line drawn from Dunbar southwesterly to Girvan; the country between these lines forms the Central Lowlands. The Highland division is remarkable for the number and elevation of its mountain masses, many of the summits being over 4,000 ft. high. The mountains best known by name are the Grampians, which form a system or series of masses covering a large area, and culminating on the west coast in Ben Nevis, 4,406 ft. high; while 55 mi. to the northeast rises a remarkable cluster of summits reaching in Ben Macdhui the height of 4,296 ft. The Grampians and their connections are separated from the mountains farther to the north by Glenmore or the Great Glen of Scotland, a remarkable depression stretching quite across the country from sea to sea, and forming, by the series of lakes occupying it, and the Caledonian Canal connecting them, a waterway from the west coast to the east. The Southern Uplands are also essentially a mountainous region, summits of over 2,000 ft. being frequent, though none exceed 3,000 ft. above the sea. The Central region, though much less elevated than the other two divisions, has none of the monotony usual in flat countries. Though

## Scotland

occupying not more than a sixth of the whole surface, the fertility of the soil and its mineral treasures make this part by far the wealthiest and most populous. The present form of the land surface of Scotland is the effect of erosion or denudation. The country was at one time an elevated table-land, the upper surface of which is indicated by the summit of mountain masses, but has been deeply trenched and furrowed in all directions by the erosive action of water, ice, and frost. The slope of the ancient plateau may be determined by the direction of the principal rivers; in the northern part it is chiefly toward the east, in the southern more equally east and west.

*Rivers and Lakes.*—The chief rivers flow (roughly speaking) to the east, and enter the German Ocean, the largest being the Tweed, Forth, Tay, South Esk, North Esk, Dee, Don, Deveron, Spey, Findhorn, etc.; those entering the sea on the west are the Clyde, Ayr, Doon, Dee, Nith, Annan and Esk. The Tay carries to the sea a larger quantity of water than any river in Britain, but neither it nor most of the others, except when they form estuaries, are of much use for navigation. The Clyde, however, in its lower course carries a vast traffic, this being rendered possible chiefly by dredging. Many of the rivers are valuable from the number of salmon they produce. A striking feature of the country is the great multitude of lakes, varying in size from Loch Lomond (28 sq. mi.) to the pool-like mountain tarns. In the Northern Highlands almost every glen has its lake and every mountain hollow is filled by a stream or spring. Among the more noted are lochs Lomond, Katrine, Tay, Earn, Rannoch, Awe, Shiel, Laggan, Lochy, Ness, Maree, Shin, in the Western and Northern Highlands; Loch Leven, in the Central Lowlands; and St. Mary's Loch, lochs Ken, Dee, and Doon in the Southern Uplands.

*Geology.*—As regards geology the older or palæozoic rocks predominate almost everywhere in Scotland. The Highlands are composed almost entirely of crystalline schists, gneiss, and quartzites; the Central Lowlands of old red sandstone, carboniferous, and Permian strata; the Southern Uplands mostly of rocks of Silurian Age. In certain localities remains of secondary formations are represented over small spaces, while volcanic rocks cover considerable areas. Granite exists in great masses in many localities, and in some parts is extensively quarried. The most valuable mineral region is the Central Lowlands, where coal and iron exist in such quantities as to make this one of the most important mineral fields of Great Britain.

For *Agriculture, Manufactures, Trade*, etc., see *Great Britain*.

*Political Constitution.*—The Parliament of Scotland anciently comprised all who held any portion of land, however small, from the crown by tenure of military service, till the reign of James VI, when the small barons or freeholders were excused from attendance in person, "two or more wise men" being deputed from each county in proportion to its size. Its pow-



## Scotland

ers were nominally extensive, but the supreme power was virtually in the king, who by his influence often entirely controlled its proceedings. The Parliament in the whole consisted of three estates—the nobility, the dignified clergy (consisting of bishops, abbots, and priors), and the lesser barons, or representatives of shires and burghs. When Presbyterianism was formally ratified by law after the revolution of 1688, the ecclesiastical estate ceased to have a place in Parliament. Every measure brought before Parliament was previously prepared by a committee, styled the lords of the articles, chosen from each of the three orders, but in effect little better than the royal nominees. Before the Union there were four great officers of state—the lord high-chancellor, the high-treasurer, the lord privy-seal, and the secretary; and there were also four lesser officers—the lord clerk-register, the lord-advocate, the treasurer-depute, and the justice-clerk. Previously to the era of the revolution the privy-council of Scotland assumed inquisitorial powers, and even torture was administered under the sanction of its authority; but it is now entirely merged in the privy-council of Great Britain. The number of peers in the Scottish Parliament was latterly 160, and of commons 153, and all sat in one house, and voted promiscuously. At the union of the kingdoms the political system of Scotland was almost entirely incorporated with that of England. See *Britain, Parliament*.

The Court of Session is the supreme civil court of Scotland. The Court of Justiciary, or criminal court, composed only of judges of the Court of Session, is supreme in the highest sense, since its decisions in criminal cases are not subject to any review. The principal subordinate judicatories are sheriff courts, established in each county or stewartry. Sheriff substitutes, or judges ordinary, one or more holding separate courts in different districts, decide in the first instance, subject to the review of the principal sheriff or sheriff depute, whose decisions, though final within its jurisdiction are reviewable by the Court of Session, with the exception of classes of cases provided for by special statutes. Besides the sheriff court, each county or district of a county has its justice of peace courts, in which judges not stipendiary decide on principles of equity in minor crimes; and in every town of any importance are bailie, dean of guild, and police courts, with limited jurisdictions.

**Education.**—Scotland has had the advantage of a national system of elementary education for over two centuries, a school having been established in every parish by a law of 1696 (where such a school was not already established), according to a system proposed by John Knox long before. This scheme did effective service for the education of the people, till the great increase in population, especially in towns, rendered it unequal to the task laid upon it, and this notwithstanding the erection of many schools by various religious denominations. By the passing of the education act of 1872 board schools have superseded the old

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parish schools, there being also numerous grammar or high schools and academies in every town of any size, though no systematic scheme of secondary education. Other institutions are the normal or training schools and colleges of the different religious bodies, and the four universities of Edinburgh, Glasgow, Aberdeen, and St. Andrews. The first university was that of St. Andrews, dating from 1411; next came that of Glasgow (1450), then King's College and University, Aberdeen (1494), then Edinburgh University (1582), lastly Marischal College and University, Aberdeen (1593). The two Aberdeen universities were united in 1860. Education is free and compulsory between the ages of five and fourteen.

**History.**—The country now called Scotland emerges from pre-historic obscurity during the Roman occupation of Britain, though for many centuries little is known of its history. It is supposed that the earliest inhabitants of the country were a non-Aryan race resembling the Iberians, and typified now by the Basques. A Celtic (and Aryan) people seem subsequently to have entered the country, and to have gained predominance over the non-Aryans, the combined people occupying at the Roman invasion (see *Britain*) most of the country north of the Forth and Clyde estuaries, which was called Caledonia by the Romans, and its people Caledonians. The southern part of the country was inhabited by another Celtic race, the Brythons or Britons, of the same blood as the Welsh. The descendants of the Caledonians were afterward called Picts, and were the predominant people in North Britain at the beginning of the sixth century, when a colony of Scots or Dalriads from Ireland effected a settlement in Argyll, and gradually spread over the adjacent regions. It is from these Scots (a Celtic- and Gaelic-speaking people) that the country afterward received the name of Scotland, the original Scotland (Scotia) being Ireland. The Pictish tribes were divided into two great sections, the *Piccardach* or Southern Picts, and the *Cruithne* or Northern Picts. In the ninth century the Dalriadic Scots with the help of the Cruithne conquered the Southern Picts, but the Northern Picts, the ancestors of the modern Highlanders, still retained their independence. The Teutonic element was introduced into Scotland as early as the fourth century, when bands from North Germany seem to have formed settlements on the east coast south of the Firth of Forth; and this part of the country was subsequently united to the Anglian kingdom of Northumbria, which extended from the Forth to the Humber. To the west of this kingdom, from Dumbarton to the Solway and into England, extended the kingdom of Strathclyde, or Cumbria, inhabited by Romanized Britons.

About the middle of the ninth century Kenneth Mac Alpin, son of a ruler of a body of Scots established in Galloway, but of Pictish descent through his mother, united in his own person the sovereignty of both the Picts and the Scots. The Norsemen had already established a footing on the islands of the north and

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west coasts as far south as the Isle of Man, and a Norse earldom of Orkney was established. Kenneth's kingdom comprised Central Scotland (Argyle, Perth, Angus, Mearns, and Fife), with Scone as capital, the north of Scotland being mostly under independent chiefs, or *maormors*. The reigns of Kenneth and his immediate successors, Donald I, Constantine I, Grig, Donald II, Constantine II, Malcolm I, Kenneth II, Malcolm II, Duncan and Macbeth, were one continued scene of warfare with the Norsemen on one hand and with the Britons of Strathclyde and the English of Northumbria on the other. Malcolm I (943-954) obtained Cumbria (Strathclyde) as a territorial fief from Edmund I, and in 1018 his grandson, Edmund II, secured Lothian, hitherto part of Northumbria, two events which materially influenced the after history of Scotland.

On the advent of Malcolm Canmore (1058) to the throne after the death of Macbeth, the able usurper and murderer of Duncan, the purely Celtic monarchy came to an end. Malcolm's mother, the wife of Duncan, was an Anglo-Dane, sister of Earl Siward of Northumbria, and his youth had been spent at the court of Edward the Confessor. The conquest of England by William of Normandy involved Malcolm in many a serious struggle. Edgar Atheling, the heir of the English line, and many of the English nobles, sought and found refuge in Scotland. Malcolm married Margaret, the sister of the fugitive prince, who is said to have introduced into her court a degree of refinement remarkable for that time. The Scotch king twice invaded England with success, but William, having collected a large army, in his turn advanced into Scotland, and compelled Malcolm to do homage for those lands which he held within what was accounted the English territory. Malcolm Canmore and his eldest son were slain in attempting to take Alnwick Castle in 1093, and Margaret survived only a few days.

On the death of Malcolm the Celtic tribes placed his brother Donald Bane on the throne, but he was driven from it before he had reigned a year by Duncan, a natural son of the late king, who now seized the scepter. In 1098, however, Edgar Atheling obtained a force from the English king, and succeeded in gaining the kingdom for Edgar, the lawful son of Malcolm. Edgar was succeeded by his brother Alexander I, a prince whose reign is chiefly signalized by his severe administration of justice. He assisted Henry I of England, who had married his sister, in a war with the Welsh, and d. in 1124, leaving the throne to his younger brother David. David had reigned over Cumbria as earl or prince since the death of Edgar; he married a daughter of the earl of Northumberland, became earl of Huntingdon, and through this and his guardianship of the earldom of Northampton, on behalf of his stepson, he was brought into feudal relations with the Norman king of England. On the accession of the usurper Stephen to the English throne in 1135, to the prejudice of Maud or Matilda, wife of the emperor Henry V, only

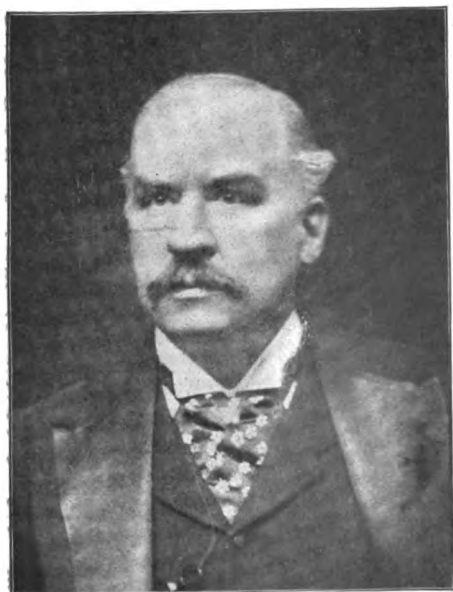
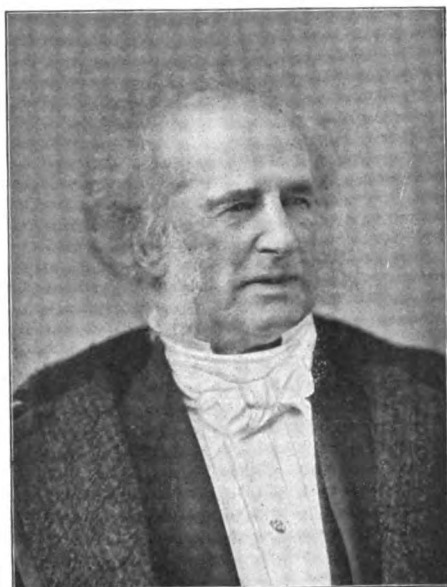
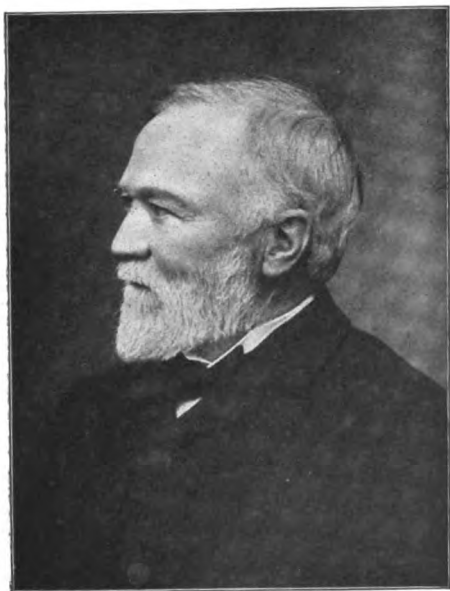
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child of Henry I and niece of David, the latter made several expeditions into England in support of his niece's claim to the throne, during which he suffered an indecisive defeat near Northallerton (Battle of the Standard, 1137). He acquired a great reputation for sanctity, having founded several new abbeys, including those of Holyrood and Melrose, and reorganized most of the Scotch bishoprics. His services to the church procured him canonization, but his endowments so taxed the royal resources that he was bitterly characterized by James VI as a "sair sanct for the crown." His death in 1153 was preceded by that of his only son, so he was succeeded by his grandson, Malcolm the Maiden, whose reign of twelve years is only remarkable for his giving up Northumberland and Cumberland to the English king.

On the death of Malcolm IV in 1165 the crown fell to his younger brother William, who is known by the title of William the Lion. During an expedition into England for the purpose of regaining Northumberland he was taken prisoner (1175), and sent to Falaise in Normandy, where a treaty was concluded acknowledging the supremacy of England, and declaring Scotland a fief and himself a vassal of the English crown. This treaty remained in force till 1189, when Richard I restored Scottish independence for the sum of 10,000 marks in order to equip a force to join the third Crusade. The rest of William's reign was devoted to the consolidation of his kingdom in the north and west. The Scotch alliance with France, and many of the Scottish burgh charters, date from this reign.

His son and successor, Alexander II (1214-49), a youth in his seventeenth year, took the side of the English barons in their struggle with King John, in the hope of recovering the Northumbrian and Anglo-Cumbrian provinces. After much blood had been shed, and the border lands repeatedly devastated, Henry III agreed in 1237 to give the King of Scots certain manors in Cumberland and Northumberland, not in sovereignty, but in feudal property. This was accepted, and a border line was laid down which has never since been altered to any considerable extent. The rest of Alexander's reign was spent in extending his authority more firmly over the territory north of the Moray Firth and in the Western Highlands.

His son Alexander III (1249-1286) succeeded in the eighth year of his age, and his minority was characterized by a series of contests between an English and national party for the regency, which ultimately fell to the queen dowager and her husband the Earl of Menteith. In his twelfth year he was married to his cousin Margaret, daughter of Henry III. One of the chief events of his reign was the war that broke out with Haco of Norway for the possession of the Western Islands, which ended in the victory of the Scots at Largs (1263), and the consequent cession of the Isles to Scotland (1263). In 1284 the king was left childless, and a meeting of the Estates at Scone settled the crown on the Maid of Norway,



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daughter of Eric, king of Norway, and Alexander's daughter Margaret. Alexander was killed by a fall from his horse near Kinghorn in Fife (1286). A fragment commemorative of his death, and evidencing the prosperity of Scotland during his reign, has been preserved in Wyntoun's Chronicle, and is the earliest known specimen of Scottish poetry.

Margaret of Norway was only three years old at Alexander's death, and a regency consisting of four barons and two bishops was appointed. Edward I, desirous of joining the two countries in one kingdom, proposed that a marriage should take place between the young queen and his son (afterward Edward II). This was agreed to by a treaty signed at Brigham near Roxburgh, which made strict provision for the independence of Scotland. The scheme, however, was frustrated by the death of Margaret in one of the Orkneys when on her way to Scotland (September, 1290). On the death of Margaret a host of rival claimants for the throne appeared, all of whom ultimately gave way to three descendants of David, earl of Huntingdon, brother of William the Lion. John Baliol claimed as grandson of David's eldest daughter, Robert Bruce as son of David's second daughter, and David de Hastings as grandson of the third daughter. Edward I, being asked to settle the dispute, decided in favor of Baliol, who was crowned at Scone (1292), acknowledging Edward as his over-lord. On the outbreak of war between England and France the weak monarch was compelled by his nobles to enter into an offensive and defensive alliance with France, and to formally renounce his allegiance to Edward (1296). Edward immediately invaded Scotland, stormed and took Berwick, and reduced the fortresses of Dunbar, Roxburgh, Edinburgh, and Stirling. Baliol surrendered in the neighborhood of Brechin, and Edward after marching north, probably as far as Elgin, returned to Berwick to receive the homage of the Scotch bishops, barons, and knights. Baliol himself was committed to the Tower of London. Scotland was now occupied by English garrisons and placed under English officials; and Edward seemed to have entirely accomplished his cherished purpose, when Wallace, the man of the people, appeared.

William Wallace, youngest son of Sir Malcolm Wallace of Elderslie, first came forward in a private quarrel with Haselrig, English governor of Lanark, which developed into a successful rebellion in the southwest and center of Scotland. Assisted by some of the barons and a considerable body of men, he defeated the English governor, the earl of Surrey, at Stirling Bridge (Sept. 11, 1297), drove Edward's garrisons out of the country, and made a raid into England. He assumed the title of Guardian of Scotland in the name of Baliol, and directed his energies to rectify the abuses and disorders of the country, and to revive the trade with the free towns of the continent. Edward, who was in Flanders, hastened home, and marching at the head of a large army, defeated Wallace at Falkirk (July 22, 1298), and

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before 1303 had repossessed himself of the whole country. In 1305 Wallace was betrayed into the hands of the English near Glasgow by Sir John Menteith, was carried to London, and after a mock trial was condemned as a rebel and traitor to Edward and executed (Aug. 23, 1305).

Wallace soon had a more fortunate, though not a more valiant, successor in Robert de Bruce, earl of Carrick, grandson of that Bruce, lord of Annandale, who had been Baliol's rival in the dispute concerning the Scottish crown. He had long been an unwilling and restless retainer of Edward, but latterly determined to push his claims in Scotland, and was crowned as king of the country at Scone in 1306. At first his career was not successful, but the death of Edward I at Burgh-on-Sands, on his way to Scotland, and the inactivity of his son, Edward II, were turning points in the recovery of the independence of Scotland. Gradually Bruce recovered the whole country, till in 1313 the only English garrison left was Stirling Castle, which was closely besieged by the Scotch. To relieve it Edward II led into Scotland a great army, which was totally defeated by Bruce in the battle of Bannockburn (June 24, 1314). After this victory Bruce reigned with almost uninterrupted success, and d. in 1329.

On the death of Robert Bruce his son, David II, a boy six years old, was proclaimed king, and acknowledged by the great part of the nation. Edward Baliol, however, the son of John Baliol (who d. 1314) formed a party for the purpose of supporting his pretensions to the crown; he was backed by Edward III of England. At first Baliol was successful; and on Sept. 24, 1332, he was crowned king at Scone, but eventually David succeeded in driving him from the kingdom. Still, however, the war was carried on with England with increased rancor, till at length David was made prisoner at the battle of Neville's Cross, near Durham (Oct. 7, 1346). After being detained in captivity for eleven years he was ransomed for 100,000 merks.

At his death in 1370, childless, the succession fell to Robert, the son of Walter, the high steward, and Marjory Bruce, daughter of Robert I (Bruce), Robert II being thus the first of the Stewart, or, as it came to be written, Stewart or Stuart dynasty. He concluded a treaty with France, in which the nations mutually stipulated to assist and defend each other. His reign was on the whole peaceful, though the usual border raids between Scotland and England continued, the chief ending in the celebrated fight at Otterbourne or Chevy Chase. Robert II d. in 1390, and was succeeded by his son John, who upon his accession took the name of Robert III. Scotland at this time was rent by the dissensions of its powerful barons and feuds of hostile clans, and Robert was of too weak and indolent a character to cope with the turbulent spirits of the age. An invasion of Henry IV in 1400 effected nothing. In 1402 the Scots sent an army under Douglas to make reprisals on Eng-

land, but they were met by the English under Percy at Homildon Hill and completely routed. The latter part of the reign of Robert III was disturbed by the ambition of his brother, the Duke of Albany, who is said to have caused the death of the profligate young Duke of Rothesay, the heir to the throne. Afraid for the safety of his second son, James, Robert designed to send him to France; but the ship in which he was being conveyed was captured by the English, a misfortune which hastened the king's death (1406).

James I being then only eleven years of age, and a captive, the regency devolved on the Duke of Albany. The kingdom was torn with internal strife. Several of the more powerful nobles were conciliated by grants of land; but Donald, lord of the Isles, the most powerful Highland chief, marched into Aberdeenshire with a great host, and threatened to overrun Lowland Scotland. He was totally defeated at Harlow by a much inferior force (July 24, 1411), and the country was saved from this danger. The excellent education bestowed on James in England in some measure compensated for the injustice of his capture and detention. In England also he obtained a wife, namely Joanna Beaufort, daughter of the earl of Somerset and niece of King Henry V. Their marriage facilitated the negotiations for his release, and after nineteen years of captivity he and his bride were crowned at Scone (1423). On his return the regent Murdoch of Albany was put to death, reforms in the constitution of parliament and in the statute law effected, lawlessness put down, and the connection between Scotland and France strengthened. James's efforts to diminish the power of the great nobles provoked a conspiracy against him, and he was murdered in the Blackfriars' Monastery at Perth (Feb. 20, 1437). In this reign the University of St. Andrews was founded (1411).

His son and successor James II being only seven years of age, the country was subjected to the miseries of a long and feeble regency. One of the chief events of his reign was the rebellion and temporary overthrow of the powerful house of Douglas. James was accidentally killed by the bursting of a cannon at the siege of Roxburgh Castle (Aug. 3, 1460). James III was not quite eight years of age when he succeeded to the kingdom, which was again subject to all the troubles of a minority. In 1467 the young king married Margaret, daughter of the Norse king Christian, and in the shape of a pledge of payment of her dowry the Orkney and Shetland islands were given up to Scotland, of which they have ever since formed a part. James seems to have been a man of culture, but weak of will and partial to favorites. A confederation against him was formed by a number of his nobles in 1488; the forces met at Sauchieburn, near Stirling, where the royal army was defeated, and James was murdered in the flight.

James IV, who had been induced to join the nobles hostile to his father, was sixteen years old when he ascended the throne. In 1503 he

married Margaret, daughter of Henry VII of England, and thus paved the way for the future union of the two kingdoms. During the early part of the reign of Henry VIII James was induced to espouse the French cause and to invade England. This disastrous campaign ended in the total destruction of his splendid army, his own death and that of most of the nobles who accompanied him, at Flodden Field (Sept. 9, 1513).

The king's death plunged the nation into a state of anarchy; his infant successor James V had not yet reached the age of two years. His cousin, the Duke of Albany, was appointed regent, but from an early part of the reign James was almost entirely in the hands of the Earl of Angus, who had married the queen dowager, and had almost complete control of affairs till 1528, when James, then in his seventeenth year, managed to escape to Stirling, take the government into his own hands, and drive Angus into England. His alliance was sought by England, France, and Spain, and in 1537 James married Madeleine, daughter of Francis I. The young queen died a few weeks after her arrival in Scotland, and in the following year James married Mary of Lorraine, daughter of the Duke of Guise. Henry VIII made several attempts to induce James to throw off allegiance to Rome in vain. A conference was proposed at York. James failed to attend, and Henry at once declared war. The Scottish king assembled his whole army, but had to disband it owing to the discontent of his nobles. Another force was dispatched to England by the western border, but an obnoxious favorite of James being in chief command, the troops refused to obey, and a small English force taking advantage of the disorder, the total defeat of Solway Moss was the result. A few days afterward James died at Caerlaverock Castle (Dec. 14, 1542), having just received tidings of the birth of his daughter, the future Mary Queen of Scots. In many ways James consulted the good of his subjects, but his continued efforts to depress the nobility embroiled him with that powerful body. He was popular with the people as a whole, and strictly administered justice. He was a supporter of the old faith as against the reform doctrines.

The eventful period which followed the accession of Mary was dominated by the Reformation movement, and the questions affecting the Union of Scotland and England. A scheme to affiancé the young queen to Edward, son of Henry VIII, was defeated by a party of the nobles getting possession of the queen, and renewing the old league with France. The consequence was war with England, when the whole of the southeast of the country was devastated, and the Scottish army defeated at Pinkie (1547). In the following year Mary was sent to France, her mother filling the regency. In 1558 she was married to the dauphin who succeeded to the throne the following year, but d. in 1560. Mary then returned to Scotland, where she found the nobility divided into two parties, the Roman Catholics headed by Huntly, and the Reformed party



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headed by her half brother, Lord James Stewart, afterward Earl of Moray or Murray. At first she was disposed to conciliate the reformers on condition she was allowed the exercise of her own faith. This was agreed to by Moray, who was practically prime minister, and the moderate section of the reformers, but did not satisfy the extreme section headed by Knox. The chief military incidents of her early reign are a raid headed by Moray against the turbulent and plundering borderers, in which many of them were slain in fight and others executed; and the suppression of the revolt of the Catholic Earl of Huntly, the most powerful chief of the north. Huntly himself fell in battle in 1562 at Corrichie, about 16 mi. w. of Aberdeen, his son was arrested and executed, and the power of the house was broken. In spite of Knox's party, Mary's reign was popular up till her unfortunate marriage with Darnley in 1565. Moray, who opposed the marriage, had to fly, and was henceforward her enemy. The marriage was unhappy. Darnley was murdered by the Earl of Bothwell and his servants, but whether Mary was accessory to the murder is yet a matter of controversy. The fact remains that she married Bothwell within three months, and alienated the greater number of her subjects. A confederacy was formed against her, and after a vain show of resistance at Carberry Hill she surrendered, and was imprisoned in Lochleven Castle, where she was forced to abdicate in favor of her infant son, and commit the regency to Moray (1567). In May next year she escaped, and raised an army, which was met by Moray and the Protestant nobles at Langside, near Glasgow, and was defeated. Flying to England Mary put herself under the protection of Elizabeth. Here she drops from Scottish history, but her after life till her execution in 1587 was a continual series of plots to regain her lost throne.

James VI, the son of Mary, being a mere child, Moray held the regency of the kingdom, conducting its affairs with a wise and firm hand, till Feb. 26, 1570, when he was shot in the streets of Linlithgow by Hamilton of Bothwellhaugh. His death was followed by a succession of regents—Lennox, Mar, and Morton—by great disorders in the kingdom, and a war between the parties of the king and queen. Morton was executed in 1581, and the other chief events of the reign, prior to the union of the crowns by the accession of James to the throne of England as James I, were the raid of Ruthven, the marriage of James to Ann of Denmark, and the Gowrie conspiracy. On the death of Elizabeth in 1603, James succeeded as the nearest heir, through his descent from Margaret, daughter of Henry VII and wife of James IV. He was crowned at Westminster, and assumed the title of King of Great Britain, France, and Ireland.

There were seven Scottish Parliaments called by James after his accession, wherein he was represented by a commissioner sitting as president. His chief energies were directed to an attempt to draw England and Scotland into a

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closer union by means of harmonizing the laws of the two countries, and by establishing episcopacy in Scotland. In furtherance of the latter object he visited Scotland in 1617 for the only time after the union of the crowns. There were many acts passed for promoting trade and commerce, and the nation about this time seems to have been seized with a mania for colonization, as many thousands of the inhabitants left their native land for the Irish province of Ulster, or the more distant shores of Nova Scotia. James VI d. in 1625, and was succeeded by his son, Charles I, then in the twenty-fifth year of his age.

Foreign wars and domestic troubles prevented Charles from visiting Scotland till 1633 when he was crowned at Edinburgh. The church was now entirely governed by the bishops, and civil affairs managed by the privy council. At the outbreak of the civil war in England, Scotland took the part of the Parliament against the king, the Solemn League and Covenant being entered into between the Scottish Presbyterians and the English Parliament (1643). A Scottish army entered England under Alexander Leslie, earl of Leven, and was of considerable assistance to the parliamentary forces at Marston Moor and elsewhere. Meanwhile Montrose overran the country with his wild Highland and Irish army, till his career was cut short by Gen. David Leslie at Philiphaugh in 1645. The affairs of the king becoming hopeless in England, Charles gave himself up to the Scottish army posted before Newark, May 5, 1646, and was surrendered to the English Parliament, Jan. 30, 1647, on payment of the arrears of pay of the Scottish troops.

After the execution of Charles (Jan. 30, 1649) the Scots proclaimed his son king, under the title of Charles II. The young king was then in Holland, and certain commissioners were sent over from Scotland to inform him that the governing body were willing to espouse his cause if he should take the covenant with its companion testimonies, and engage to do his utmost to enforce the whole Covenanting system over England and Ireland. This Charles agreed to do, and he was invited over to his northern kingdom. He arrived in Scotland, landing at the mouth of the Spey, July 3, 1650, and marched southward by Aberdeen, Dundee, and St. Andrews to Falkland Palace. This royal progress alarmed the republican council of state at Whitehall, and a force under Cromwell was dispatched to stop it. Gen. David Leslie marched to meet Cromwell, but was defeated at Dunbar (Sept. 3, 1650). Notwithstanding this defeat, Charles was crowned at Scone (Jan. 1, 1651), and immediately marched into England. Cromwell followed, and at Worcester utterly scattered the royalist force, and compelled Charles to become a fugitive (Sept. 3, 1651). Cromwell returned to Scotland and so far reduced it, leaving Monk to complete the work. This was brought about by the sack of Dundee in 1653 and other severe measures. Cromwell's death was followed by his son's fall, Monk's march to London at the head of the army, and the restoration of Charles II (1660).

The Scottish Parliament assembled under the Earl of Middleton, the king's commissioner, Jan. 1, 1661, and it soon became apparent that Charles was determined to carry out the favorite scheme of his father and grandfather of establishing Episcopacy in Scotland. This endeavor to establish Episcopacy was violently opposed, and led to a cruel persecution, which lasted with more or less severity during the whole of the reign of Charles. Hundreds were executed on the scaffold, others were fined, imprisoned, and tortured; and whole tracts of the country were placed under a military despotism of the worst description. In 1679 a body of royal troops under Graham of Claverhouse was defeated by a force of Covenanters at Drumclog. Six weeks later the Covenanters were defeated with terrible slaughter at Bothwell Bridge. Charles d. in 1685, and was succeeded by his brother, James VII of Scotland and II of England. The chief events of his reign, so far as Scotland was concerned, were the rising, defeat, and execution of Argyle; the declarations of indulgence by which many of the Presbyterian ministers returned to their charges; and the continued persecution of the strict Covenanters, one of whose ministers, Renwick, the last of the Covenanted martyrs, was executed at Edinburgh in 1688.

At the revolution a convention of the Estates at Edinburgh proclaimed William, prince of Orange, James's son-in-law and nephew, and his wife Mary, James's daughter, king and queen of Scotland. Claverhouse, now viscount of Dundee, raised an army of Jacobites, but his death at Killiecrankie (1689) put an end to the rising. Religious freedom was again restored, and in 1690 a general assembly of the Presbyterian Church again met. The reign of William III was marked by two events which rendered him generally unpopular in Scotland and strengthened the cause of the Jacobites, as the party who still adhered to James II was called. We allude to the massacre of Glencoe and the unfortunate Darien expedition, but the reign closed without any serious rising in Scotland.

The death of William III in 1702 transferred the crowns of the two nations to Queen Anne, sister of Mary. In 1703 the Parliament of Scotland issued a declaration which intimated a purpose, in case of a demise of the crown, to appoint a different sovereign from the English king, and the ill feeling between the two countries grew so strong that English statesmen became convinced that an incorporating union was essential for the peace of the two countries. A joint commission was appointed to draw up articles of union in 1706. The Scottish Parliament met to consider the articles, which encountered a strong opposition headed by the Duke of Hamilton, and strongly backed up by the bulk of the people. A majority of the Parliament, however, carried the measure (Jan. 16, 1707); it received the royal assent (March 4); and the Union took effect (May 1). The chief provisions of the Act of Union were, 1, That the two kingdoms should be united under

the name of "Great Britain;" 2, that the succession to the crown of the United Kingdom should be in the Electress Sophia of Hanover and her heirs, being Protestants; 3, that 16 Scottish peers and 45 Scottish members of the House of Commons should be elected to the one Parliament sitting in London; 4, that the Established Presbyterian Church of Scotland should be maintained; 5, that Scotland should keep unchanged her own laws and customs relating to property and private rights, and also the Court of Session and other Scotch courts; 6, that all the rights of trade, free intercourse, and citizenship should be the same for Scotch and English subjects. Henceforth the general history of Scotland may be said to be entirely identified with that of England. See *Great Britain*.

*Language and Literature.*—Down to the fifteenth century the term Scottish language meant the Gaelic or Celtic tongue; the language of lowland Scotland being looked upon as English, which, indeed, it was and is—Northern English, with certain peculiarities of its own. The term Scottish came to be applied to it as possessing these peculiarities, and as having a somewhat distinctive literary use. This language has been divided into three periods. During the *early* period, extending to near the end of the fifteenth century, there was little difference between the language of Scotland and that of England north of the Humber. In the *middle* period, which extended to the Union, it was influenced in a slight degree by the Gaelic, and in a more pronounced manner by French and Latin, consequent on the French alliance and the revival of learning. During the modern period the language, as used in popular poetry, etc., has been to a considerable extent affected by modern literary English, though the genuine vernacular may still be heard in many districts with dialectic peculiarities according to locality.

The *Sir Tristrem*, a metrical romance, doubtfully attributed to Thomas the Rhymer, is by some regarded as the earliest piece of Scottish literature, and is generally accounted the earliest specimen of Romance poetry in Britain (end of the thirteenth century). But the first undoubted specimen of Scottish literature is the *Bruce* of Barbour (about 1375). Between 1420 and 1424 was written *Wyntoun's Orygynale Cronykil of Scotland*, and about 1460 Henry the Minstrel, commonly called Blind Harry, did for Wallace what Barbour had done for Bruce. Another of the poets of this early period is no less a personage than James I (1394–1437), author of the *King's Quhair*. *Christis Kirk of the Grene* and *Pebbles to the Play*, long believed to have been productions of James, have to be attributed to some other early poet. Down to the middle of the sixteenth century four names stand out prominently, viz., Henryson, Dunbar, Gavin Douglas, and Sir David Lyndsay. Minor poets of this period were Walter Kennedy, Sir John Rowll, Quintin Shaw, and Patrick Johnstone. In 1536 John Bellenden, archdeacon of Moray, published the *History and Croniklis of Scotland*, a translation of Boece's *Historia Gentis*

*Scotorum*, which was also versified by William Stewart, a descendant of the first earl of Buchan. The anonymous *Complaynt of Scotland* (1548) is of value as preserving the titles of several popular pieces of contemporary literature now lost, and as a piece of early prose. The poems of Sir Richard Maitland (1560) are curious, but his title to remembrance, as well as that of George Bannatyne (1568), rests on their extensive MS. collections of Scottish poetry, the one preserved in the Pepysian Library at Cambridge, the other in the Advocates' Library, Edinburgh. With the exceptions of Alexander Scott, Arbuthnot, Rolland of Dalkeith, Alex. Montgomery, Sir William Alexander, and Drummond of Hawthornden, about a century and a half now elapses before we come upon the name of any eminent Scottish poet; most of the scholars of that period, such as Major and Buchanan, addressed themselves to the world at large and wrote in Latin. We have, however, vernacular prose works of merit in *Lyndsay of Pittscottie's Chronicle*, and Knox's *History of the Reformation*. In the third period of the language, when it had become a provincial patois, the first notable name is that of Allan Ramsay (1686-1758), author of *The Gentle Shepherd*, and of numerous shorter pieces and songs. To this same age belongs also nearly the whole of that remarkable body of song known as the Jacobite minstrelsy. The most prominent Scotch writers, aside from those mentioned, are Ferguson, Robert Burns, Hector Macneil, Sir Walter Scott, James Hogg, Tannahill, John Galt, George Macdonald, John Watson and J. M. Barrie, while many of those ascribed to England were native Scotchmen, and a still larger number received their education at the famous Scotch universities. Besides these there is a long list of philosophers, legal writers and physicians, such as Adam Smith, Barclay and Liddell. For Scotchmen famous in English literature, see *England*, sub-head *Literature*.

**Scott, Sir Walter, Bart.** (1771-1832), poet and novelist, was b. in Edinburgh. He entered the high school of Edinburgh in 1779, and in October, 1793, he was matriculated at the University of Edinburgh, but neither at school nor at college did he manifest any special brilliance. At the age of sixteen he commenced in his father's office an apprenticeship to legal business, and in 1792 he was admitted a member of the Scottish bar. In 1797 he married a Miss Charpentier, the daughter of a French refugee; in 1799 he was appointed sheriff of Selkirkshire, and in 1806 he became a principal clerk of the Court of Session. His first ventures in literature were a translation of Bürger's *Lenore*, and *Der wilde Jäger* (*The Wild Huntsman*), which he published in 1796; then followed the ballads of *Glenfinlas*, *The Eve of St. John*, and the *Gray Brother*; a translation of Goethe's *Goetz von Berlichingen* in 1799; the *Minstrelsy of the Scottish Border* in 1802-3; and an edition of the old metrical romance of *Sir Tristram* in 1804. In 1805 he became prominent as an original poet with the *Lay of the Last Minstrel*, an extended speci-

men of the ballad style, which fell upon the public as something entirely new, and at once became widely popular. In 1808 he published *Marmion*, another poetic romance which greatly increased his reputation; and in 1810 the *Lady of the Lake*, in which his poetical genius seems to have reached the acme of its powers. His subsequent poetical productions: *The Vision of Don Roderick*, *Rokeby*, *The Bridal of Triermain*, *The Lord of the Isles*, *Harold the Dauntless*, *Halidon Hill*, *The Auchinrane Tragedy*, *The Doom of Devergoil*, did not attain the same success. On the decline of his popularity as a poet he turned his attention to the prose romance, for which the greater part of his early life had been a preparation. The appearance of *Waverley*, in 1814, forms an epoch in modern literature as well as in the life of Scott. This romance or novel was rapidly followed by numerous others, forming, from the name of the first, the series known as *The Waverley Novels*. These splendid works of fiction which surprised and enchanted the world, mark the high tide of his genius. The desire of becoming an extensive landed proprietor, and of founding a family, was a passion which apparently glowed more warmly in his bosom than even the appetite for literary fame. This desire he began to gratify in 1811, when he purchased a small farm of about 100 acres, lying on the south bank of the Tweed, 3 mi. above Melrose, upon which was a small and inconvenient farmhouse. By degrees as his resources increased, he added farm after farm to his domain, and reared his chateau turret after turret, till he had completed what a French tourist not inaptly terms "a romance in stone and lime;" clothing meanwhile the hills behind, and embowering the lawns before, with flourishing woods of his own planting. In 1820, when he was made a baronet by George IV, who was a great admirer of his genius, he reached the zenith of his fame and outward prosperity. But this prosperity was founded on no solid basis, and the crash came in 1826, when Constable & Co., Edinburgh publishers, were obliged to suspend payment, hopelessly involving Ballantyne & Co., with whom it then appeared Scott had been connected as a partner since 1805. The liabilities which were thus incurred by him amounted to \$650,000. His humiliation was indescribable, but he met the trial with strength and dignity. Liberal offers of assistance were made to him, but he refused them all. "Time and I against any two," he said, and leaving Abbotsford and taking a lodging in Edinburgh, he worked like a galley slave in order to clear off the debt. Within a few years he was able to pay his creditors \$200,000, and to put things in such shape that soon after his death the whole debt was liquidated. He was interred in his family burial aisle amidst the ruins of Dryburgh Abbey. The biography of Scott written by his son-in-law, John Gibson Lockhart, has become a classic. Pl. 36, Vol. IV.

**Scott, Winfield** (1786-1866), commander-in-chief of the U. S. army, was the son of a Scottish Jacobite, and was b. near Peters-



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burg, Va. He was brought up to the law, and admitted to the bar, but never practised. Entering the army he served with distinction in the War of 1812-14, and afterward visited Europe, and studied military science at Paris. In 1832 and the following years General Scott was employed in operations against the Indian tribes, and in 1841 he was appointed commander-in-chief. His fame rests upon his brilliant conduct of the Mexican War of 1846-47, in which he gained several victories over Santa Anna, made himself master of Mexico, and concluded an advantageous peace. He was twice an unsuccessful candidate for the presidency. On the outbreak of the great Civil War he remained true to the Federal government, but was too infirm to take any actual command. He retired from active service in 1861, and in 1864 he published his autobiography.

**Scranton**, co. seat of Lackawanna co., Pa., on the Lackawanna river and the Cent. of New Jersey, Del. & Hud., Del. Lack. & W., E. & Wyo., and the N. Y. Ont. & W. Railroads; 107 m. n. of Philadelphia. It has a picturesque location in a beautiful valley, and is noted as the center of the great anthracite coal region. It is one of the municipal distributing points for the anthracite coal trade. The chief industry is the manufacture of iron and steel, with products valued at over \$13,000,000 annually. Other manufactures are, malt liquors, silk and planed lumber. The city is the seat of a Roman Catholic bishopric and of several colleges. Pop. 1900, 102,026.

**Screw**, a wooden or metal cylinder having a spiral ridge (the thread) winding round it in a uniform manner, so that the successive turns are all exactly the same distance from each other, and a corresponding spiral groove is produced. The screw forms one of the six mechanical powers, and is simply a modification of the inclined plane. The energy is transmitted by means of a hollow cylinder (the female screw) of equal diameter with the solid one (the male screw), having a spiral channel cut on its inner surface so as to correspond exactly to the spiral ridge raised upon the solid cylinder. Hence the one will work within the other, and by turning the convex cylinder, while the other remains fixed, the former will pass through the latter, and will advance every revolution through a space equal to the distance between two contiguous turns of the thread. As the screw is a modification of the inclined plane it is not difficult to estimate the mechanical advantage obtained by it. If we suppose the power to be applied to the circumference of the screw, and to act in a direction at right angles to the radius of the cylinder, and parallel to the base of the inclined plane by which the screw is supposed to be formed, then the power will be to the resistance as the distance between two contiguous threads to the circumference of the cylinder. But as in practise the screw is combined with the lever, and the power applied to the extremity of the lever, the law becomes: The power is to the resistance as the distance be-

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tween two contiguous threads to the circumference prescribed by the power. Hence the mechanical effect of the screw is increased by lessening the distance between the threads or making them finer, or by lengthening the lever to which the power is applied. The law, however, is greatly modified by the friction, which is very great. The uses of the screw are various. It is an invaluable contrivance for fine adjustments such as are required in fine telescopes, microscopes, micrometers, etc. It is used for the application of great pressure as in the screw jack and screw press; as a borer in the gimlet; and in the ordinary screw nail we have it employed for fastening separate pieces of material together.

**Screw Pine**, the type of an order of trees or bushes known as the Pandanaceæ or Screw pine order. They are natives of tropical regions, and abound in insular situations, such as the Eastern Archipelago. They are remarkable for the peculiar roots they send out from various parts of the stem. These roots are called aerial or adventitious, and serve to support the plant. The seeds are edible; and the flowers of some species are fragrant.

**Screw Propeller**, an apparatus which, being fitted to ships and driven by steam, propels them through the water, and which, in all its various forms, is a modification of the common screw. Originally the thread had the form of a broad, spiral plate, making one convolution round the spindle or shaft, but now it consists of several distinct blades, forming portions of two, three, or four threads. The usual position for the screw propeller is immediately before the stern post, the shaft passing parallel to the keel into the engine room, where it is set in rapid motion by the steam engines. This rotatory motion in the surrounding fluid, which may be considered to be in a partially inert condition, produces, according to the well-known principle of the screw, an onward motion of the vessel more or less rapid, according to the velocity of the shaft, the obliquity of the blades, and the weight of the vessel. The successful introduction of the screw propeller is due to F. P. Smith and to Ericsson, who both independently and about the same time (1838) secured patents. Numerous modifications of the screw propeller have been proposed and adopted since it was first introduced, and it has now practically superseded the paddle wheel for sea-going vessels.

**Scribe** (skrêb), AUGUSTIN EUGÈNE (1791-1861), French dramatic writer, b. in Paris. His father was a silk merchant, and bequeathed to his son a considerable fortune. His first distinct success was achieved in 1816 with *Une Nuit de Garde Nationale*, and thenceforward his pen was never idle. His dramatic pieces comprise all the departments of the lighter kind of drama, and from their gaiety and interest of plot, as well as the felicitous manner in which modern French life is depicted in them, have acquired a universal popularity over the European continent, and have also been introduced on the American and English stage in the form of translations or adaptations. Two of the best known among them, after the first successful

one, are *Le Verre d'Eau* (*Glass of Water*) and *Adrienne Lecouvreur*. As an opera librettist Scribe is also deservedly famous, having supplied several composers, especially Auber and Meyerbeer, with the text of the most celebrated of their works.

**Scrip**, a certificate of loans or shares in a joint-stock company, forming a temporary acknowledgment of the holder's interest, and indicating the amount and date of each installment of the total subscribed or to be subscribed by him, the scrip being finally exchanged for a definite share certificate or bond.

**Scruple**, in Troy weight, is equivalent to 20 grains,  $\frac{1}{8}$  part of a drachm,  $\frac{1}{24}$  part of an ounce, and  $\frac{1}{288}$  part of a pound.

**Scudo**, an ancient Italian coin, the equivalent of a crown. It was named from its bearing the impress of the heraldic shield of the sovereign by whom it was issued. The scudo was of different value in different states and at different times. The name is sometimes given to the piece of five lire or francs, nearly equivalent to the American dollar.

**Sculpin**, a small fish found on the Atlantic seaboard and on the Pacific coast of America.

**Sculpture** is the art of imitating living forms in solid substances. The word means strictly, a cutting or carving in some hard material, as stone, marble, ivory, or wood; but it is also used to express the molding of soft substances, as clay or wax, and the casting of metals or plaster. The imitation of living form is alike the essence of sculpture and of painting, and both these arts are primarily for the use and purposes of architecture. Sculpture is distinguished from architecture by its imitation of living form, and is separable from painting by the mode of its expression. Sculpture may possess the added element of color; but while painting makes its appeal to the sense of sight chiefly through color, sculpture concerns itself wholly with pure form, whether of line or composition.

**Processes.**—In producing a work of sculpture two processes are involved, "modeling" and "casting," the former alone being truly the work of the artist. For ornament and figure the same method is employed. In the former a ground of clay is prepared, and upon it the lines of the ornament are lightly sketched, usually with a tool. These are then clothed upon firstly with important masses, then the connecting lines, and, lastly, the minor detail, the whole being afterward modeled to the forms desired. For a head or bust a flat board, set on a high stand, with a piece of wood standing at right angles to it, is used. Lead piping is sometimes further employed to raise the height of this piece of wood, and around this structure the clay is roughly built up, a cylindrical mass for the neck, and an egg-shaped form for the head. Upon this latter the position of the features is marked, and the work carried on by reference to the living model. For a full-length figure an "armature" is prepared, consisting of an iron passing through the center and attached to which are other irons in the case of statues, or of lead

piping for statuettes. These are bent to the required positions, the whole when complete representing in line the pose and character of the intended figure. Upon and around this framework the figure is first roughly built up with clay, care being taken to add just as much as is requisite, and to follow the general form and direction of the muscles. The essential difference between modeling and carving is that in the former the artist works from within outward by the addition of material, while in the latter from without inward by the taking away of material. The sculptor's work proper generally ends with the completion of the clay model. The next process is that of casting. Plaster of paris of the consistency of thick cream is poured over the model to the depth of from 2 to 3 in., the inner layer being colored. When this is set, the clay is carefully removed, and what is termed a "waste mold" is formed. This is carefully washed and when dry is then oiled. Into this mold plaster of paris is poured, and when filled and set hard the waste mold is chipped off. The plaster of paris has taken the place of the clay, and formed what is called a "cast." A head is usually cast in halves, and a similar treatment is adopted in the case of complete figures. This is termed "piece molding." Parts which project very much are removed and cast separately, being afterward attached by means of plaster of paris. The reproduction of this plaster cast in marble or stone is a mechanical operation, usually intrusted to a skilled workman. To aid him he employs a "pointing machine," by which he first finds out the distance of any point on the cast from an imaginary vertical plane placed in front, and into the block of marble drills a hole whose depth from the same plane equals this distance. Innumerable holes are thus drilled, and the solid marble cut away until the bottoms of all the holes are reached. This gives the form roughly, and the carver proceeds to copy from the plaster cast, carrying on the work under the supervision of the sculptor, who rarely carves the work himself except in finishing touches. For casting in metal a plaster mold is first made as already described. Within this is fixed a rudely-formed solid but removable mass called a "core," the space between it and the surface of the mold being filled with the molten metal. Another method for smaller work is called "*cire perdue*." In this the mold is lined with wax and the core inserted close up to the wax lining. The wax is then melted out and the molten metal poured into the mold to take its place, the core being afterward removed.

**History: Sculpture in Asia.**—The earliest records of sculpture that we possess exhibit the art in complete bondage to religion. The artist has striven not to represent human or natural beauty, but to illustrate a strange and fantastic mythology. Sculpture has here no independent existence, and no chance of gradual and steady development. The artist is restricted to the patient and often exquisite imitation of inanimate nature, or to the inven-

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tion of monstrous human form, but he is not able to rise to a conception of beauty, at once true to physical nature and charged with human emotion. Thus the sculptures of India and China are semi-barbaric and naturalistic; and in the colossal figures of the rock-cut temples of India there is a superadded symbolism, which led to the most extravagant deformities of the human figure. It is to Egypt that we must turn for the first signs of higher and more vital art. The distinctive characteristics of Egyptian sculpture are colossal size, stability, and symmetry, the expression being that of calm repose and solemnity, with a suggestion of the supernatural. A conventional uniformity reigns everywhere without life or action. Everything is subject to symbolic meaning according to formulæ laid down by authority. The work was executed in syenite or basalt, and this symbolism, linked with admirable regularity of workmanship, gives to Egyptian sculpture the distinction and dignity of a style. The best period of Egyptian sculpture was from 1450 to 1000 B.C. The best period of Assyrian sculpture, as a style, is inferior to that of Egypt. Its characteristics are an intense and vigorous spirit of representation without the least reference to ideal beauty of any kind. As compared with Egyptian work it is more realistic but less true. It is powerful and energetic, but lacks grandeur; overlaid with detail and ornamentation it does not attain to the sublime in its repose, nor to beauty in its movement. Persian sculpture (560-331 B.C.) differs but little from Assyrian, and is usually included with it. Roughly hewn and badly modeled, the force of the animal forms yet gives it a sense of the gigantic, analogous to that obtained by the Greeks in their treatment of Hercules, but without possessing no sense of ideal beauty. In the British Museum is to be found a splendid collection of Egyptian sculptures, extending from B.C. 2,000 to the Mohammedan invasion, A.D. 640.

*Greek Sculpture.*—These early products of art, valuable in themselves, are, nevertheless, chiefly interesting as leading the way to the full development of sculpture under the Greeks. Greek sculpture, in its infancy, is strongly stamped with Oriental character, as may be seen by a careful examination of the reliefs from the temple of Assos now in the Louvre, and the metopes from Selinus, casts of which are in the British Museum. But from the end of the sixth century B.C. the development of Greek art was rapid and continuous. In the sculptures for the temple of Egina, executed about 475 B.C., and now preserved at Munich, the figures of the warriors are no longer of stiff conventional type, with attitudes correct but lifeless; there is energy of movement in their action, and a living truth of gesture only to be gained by artists who had studied the human form long and attentively. Upheld on the one hand by a noble mythology, that magnified without distorting human attributes, and supported on the other by an increasing knowledge of nature, the

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ultimate perfection of Greek art became only a question of time. It came to perfection in Phidias, whose statues of Athene in the Parthenon at Athens (B.C. 438), and of Zeus in the temple at Olympia, mark the period of the highest style of Greek art. The special character of the art that flourished at Athens under the rule of Pericles (fourth century B.C.), and by the all potent hand of Phidias, consists in a perfect balance and combination of elements sublime and human. Sculpture had reached that point when a faultless imitation of nature was within its reach, but it had not yet abandoned its spiritual connection with a splendid mythology. We have, therefore, in the sculpture of this period, the highest type of human beauty joined to a god-like calm and reticence of motion. Examples of the grand style of this epoch are the sculptures of the Parthenon; the colossal bronze head of Artemis in the British Museum; the Venus of Milo in the Louvre; and the exquisite relief representing the parting of Orpheus and Eurydice in the museum at Naples. Greek art, however, rapidly moved toward a still closer imitation of actual human life. The calm elevation of spirit characteristic of the sculpture of Phidias, and of his pupil Alcamenes, was exchanged for a more lifelike rendering of passion, and the artist began to be fascinated by the force and variety of human feeling as well as by the beauty of the human form. The representatives of this latter style were Scopas and his younger contemporary Praxiteles. The most important works of Scopas that survive are the decorations to the mausoleum at Halicarnassus, erected by Artemisia over the remains of her husband Mausōlos, prince of Caria, B.C. 352. These sculptured decorations, now in the British Museum, present in the designs for the frieze, depicting a battle between Greeks and Amazons, an invention of graceful and energetic movement, and a record of rapid and violent gesture such as clearly distinguish the work from that which it succeeded. The works of Praxiteles are especially valuable as expressing a tenderness of feeling which this new and closer sympathy with human emotions had developed. He is known to us chiefly through copies of his works, or of the works of his school, the most celebrated of which are preserved in the Vatican; but the sweetness and delicate grace of his style are admirably displayed in the statue of Ceres discovered at Cnidus, and now in the British Museum. To this period belong the celebrated group of Niobe and her children; also the bronze figure of Narcissus in the Naples Museum. From the death of Alexander the Great, B.C. 323, onward to the conquest of the Romans, B.C. 146, the progress of Greek sculpture is only a further, and often a weaker, development of the same ideal. The celebrated group of the *Laocoön*, the head of the *Dying Alexander*, the *Dying Gladiator*, and the *Apollo Belvedere*, are some of the works of this epoch that are preserved to us.

*Italy.*—The history of sculpture in Italy is only a continuance of its story in Greece. It



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was Greek art produced by Greek workmen that adorned the palaces of the emperors; and the Roman sculptors, in so far as they had any independent existence, can only claim to have impoverished the ideal they received from Greece. Many of the best-known statues in existence were produced in the Græco-Roman period; as the *Borghese Gladiator* in the Louvre, the *Venus de Medici* at Florence, and the *Farnese Hercules* at Naples. From the time of Hadrian (A.D. 138) art rapidly declined, and this debased Roman was the only style employed in Italy until the revival in the twelfth century. This revival of sculpture began with Nicola Pisano, who was b. at Pisa about A.D. 1206, and whose work is preserved in the pulpits which he carved at Pisa and Siena. He was followed by his son Giovanni Pisano (d. 1320), whose great work is the allegorical group in the Campo Santo of Pisa; but both of these sculptors worked on classic lines. Jacopo della Quercia (1374-1438), whose beautiful reliefs adorning the façade of the Church of San Petronio at Bologna show a feeling for grace not before expressed, was the founder of the modern school. Lorenzo Ghiberti (1381-1455) developed a more pictorial style with extraordinary success; but sculpture awaited the advent of Donatello (1386-1468) in order to find its true direction and to reach its full triumph. His marble statue of St. George, in the church of Or San Michele in Florence, is one of the very finest works of Renaissance sculpture. Luca della Robbia (1400-81), and Andrea Verrocchio (1432-88), the master of Leonardo da Vinci, may also be named. The special tendencies of Italian sculpture may be said to have reached their full expression in the work of Michael Angelo (1475-1564). Here we see all previous efforts to interpret passion and feeling summed up and concluded. His figures are charged with all the possibilities of human experience and emotion. It was toward this complete understanding of the resources of physical expression that all Italian art had been tending, and it is only more fully exhibited in Michael Angelo because he was the greatest master that Italy produced. His works are the statues in the chapel of the Medici at Florence, the *Captives* in the Louvre, the colossal *David* at Florence, the *Moses* in Rome, and the *Madonna* in Bruges. For a long period after Michael Angelo, Italian sculptors were content to imitate, and sometimes to exaggerate his manner. Lorenzo Bernini (1598-1680), the master of the "baroco" style, exemplifies a straining after grace and elegance by means of affectation. In the eighteenth century Italy became the headquarters of the classical revival which spread thence throughout Europe. The leading spirit in this movement was Canova (1757-1822), who, although he failed to restore to his art its earlier masculine strength, at least sought in the study of the antique for greater simplicity and elegance in representation. Canova's most finished productions are notable for an affectionate tenderness of sentiment rather than imagination, and his figures are never formed

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after the highest ideal. But within the narrower limits of his style he produced much that is graceful, and he combined in a manner peculiar to himself a reminiscence of antique grace, with a feeling entirely modern and almost domestic in its tenderness. His most characteristic works are the *Graces*, the *Hebe*, and the *Cupid and Psyche* (all well known), but his finest work is the colossal group of *Theseus slaying a Centaur* at Vienna. Canova formed Thorvaldsen, the great Danish sculptor, and his name and influence dominated the art of sculpture throughout Europe for many years. His pupils were Tenerani and Giacometti, and among later sculptors occur the names of Bartolini and Duprè. Modern Italian sculpture has leaned toward realism, the leading representatives being Monteverde, Gallori, Magni and Barzaghi. Of those who avoided this tendency, the best-known are Consani, Albani, and Fedl.

*France.*—The early art of France was influenced by the then prevailing styles. Thus the sculptures of her cathedrals show Byzantine, Romanesque, and Gothic influences, the finest examples in this last being at Amiens. Awakening in the fifteenth century it produced as precursors of the Renaissance, Bouteillier and Colombe (1431-1514), and in the sixteenth century Jean Goujon (1530-72), whose best work is the *Fountain of the Innocents* in Paris, and whose *Diana* shows all the faults and beauties of the style. Cousin (1501-89), Pilon (1515-90), Pierre Puget (1622-94), Coysevox (1640-1720), and Girardon (1630-1715) continued the style which, while aiming at elegance and grace, lost simplicity and roundness. The Danish school which produced Thorvaldsen, owes its rise to French influence. Later yet come Houdon (1741-1828), Bosio (1769-1845), Rude (1785-1855), Barye (1795-1875), a sculptor of animals, and Carpeaux, whose chief work, *La Danse*, is in front of the new opera house (1827-75); and among recent artists are St. Marceaux, Frémiet (animal), Falguière, Mercié, Dalou, Rodin and Dubois (monument of General Lamoricière), Bartholdi, Barrias, Bartholomé and Rivière.

*Germany.*—There was no early school of German apart from the general Gothic style of all Northern European countries, but with the Renaissance of the fifteenth century arose Adam Kraft (1480-1507) and Peter Vischer, two contemporary sculptors of Nuremberg, and Albert Dürer (1471-1528), painter and sculptor. Then came a break until the rise of the modern school, which owes its existence to the influence of Thorvaldsen. The chief names are Dannecker (1758-1841), with his *Ariadne*, and Schadow, with *Girl Tying Her Sandal* (1764-1850). Rauch (1777-1857) was the real founder of the modern German school. His monument to Frederick the Great, at Berlin, with its many accessory figures, is his finest work, and from his school came Rietschel (1804-60), Schwanthaler (1802-48), August Kiss (1802-65), Bandel (1800-76), and Drake (1805-82). Among sculptors of recent fame are Begas, Eberlein, Zumbusch, Kundmann, Weyr, Tilgner, Strasser, Wolff, Hildebrand and Schilling.

*England.*—Of examples of sculpture executed

## Sculpture

before the eighteenth century England possessed very few. Several tombs exist, and some of the cathedrals, notably Wells, Exeter, and Lincoln, possess figures executed presumably by Englishmen at an earlier date. It is not, however, until the reign of Charles I that names of artists appear, notably among them being Nicholas Stone (1586-1647), and Grinling Gibbons (1648-1721), who was the first real artist of the English school. Cibber may be mentioned, but Joseph Wilton was the forerunner of the school which produced Banks and Flaxman. Banks (1735-1805) is the father of ideal English sculpture, but died unappreciated, leaving John Flaxman (1755-1826) to achieve the task of bringing the classical spirit into English art, and founding the school of the nineteenth century. His love for severe simplicity and true form was imbibed in Rome, and is best seen in his *Shield of Achilles*, in his *Michael Overcoming Satan*, and his *Cephalus and Aurora*. He greatly assisted Wedgwood in the design and decoration of his pottery, and executed a number of beautiful designs in outline illustrative of Homer and Dante. His most famous pupil was Baily (1788-1867), whose *Eve at the Fountain* is much admired. Sir Francis Chantry (1788-1841) worked chiefly on portrait figures and busts, and Sir Richard Westmacott (1799-1856) on monuments. John Gibson (1791-1866), a pupil of Canova, more properly belongs to the Italian than the English school, his whole artistic life having been passed in Rome. His finest works are *Psyche borne by Zephyrs*, the *Narcissus*, *Hylas Surprised*, a large relief of *Christ blessing Children*. The *Hylas* is now in the National Gallery. His introduction of color in statuary raised much discussion. Foley (1818-75), whose chief work is the equestrian statue of General Outram, now at Calcutta, and Patrick Macdowall (1799-1870), with *Love Triumphant*, are the last names of the classic school. The tendency of sculpture in England at the present day is toward a more original and naturalistic treatment. Alfred Stevens (d. 1875) is the author of the finest decorative work in England, the monument of the Duke of Wellington in St. Paul's. Of late sculptors who have contributed to England's reputation are Boehm, Woolner, Watts, Leighton, Armstead, Simonds, Brock, Thorneycroft, Ford, Gilbert, Bates, Franklin, Stark and Pomeroy.

**America.**—The first American sculptors of importance are Greenough (1805-1852), a portrait statue artist of marked achievement; Powers, whose *Greek Slave*, *Il Penseroso*, and *Proserpine* are well-known; Crawford, who produced *American Revolution* and *Indian Chief*.

Of later artists in the same group are Story, Randolph and John Rogers, Rinehart and Hosmer. These, with the intensely patriotic H. K. Browne and J. Q. A. Ward, form a school of distinctive *American* art, noticeable both in theme and execution. Others of less fame are Clevenger, Bartholomew, Meade, Palmer and Launt Thompson. Since about 1875, American sculpture has been greatly influenced by

## Scythe

the French, though some of the more important artists have had German and Italian training. Of the German-American group, Keyser, of Baltimore, is the most important. Howard Roberts and Levi Warner were among the first to display the French influence. Of most recent fame are Augustus St. Gaudens and Daniel C. French, both masters of the art, whose works have placed them in the front rank of modern sculptors. Notable among the works of French are the bronze statue of Washington, executed as a gift of American citizens to France, and the bronze doors of the Boston Public Library. St. Gaudens' greatest works are the *Shaw Memorial* on the Boston Common and the bronze equestrian statue of Sherman at the principal entrance of Central Park, N. Y. The latter is counted among the half-dozen greatest equestrian statues of the world. Frederick MacMonnies, a pupil of St. Gaudens, has recently achieved honor, both at home and abroad. Herbert Adams, Partridge, Paul Bartlett, Bitter, Niehaus, Rhind, Proctor, Kemys, Barnard and Lorado Taft are among the younger men who have reflected credit upon American sculpture. On the whole it may be said of American sculpture, that it has started along a path which leads to works of permanent value, namely, independent and consistent labor. It does not disregard the classic forms, but it adds to them an individuality and flexibility which well represent the free and vigorous character of American life. Such buildings as the Library of Congress at Washington and such decorative achievements as the sculpture of our recent expositions testify both to the demand for good art and the ability of our own sculptors to meet that demand. According to the opinions of great art critics our school of sculpture can now compare favorably with the new school of any country.

**Scu'tari**, a town of Asiatic Turkey, on the Bosphorus, opposite Constantinople, of which it is a suburb. It is built on an amphitheater of hills, and contains numerous mosques, fine bazaars and baths, barracks, and a seraglio of the sultan. Scutari contains granaries and is a fruit market. The manufactures are saddlery, silk, muslin, and cotton stuffs. Pop. 60,000.

**Scu'tari**, a town of European Turkey, capital of North Albania, at the south end of the lake of same name. It has manufactures of arms and cotton stuffs, and being situated on the Bojana, by which the lake discharges its waters into the Adriatic, is favorably situated for commerce. Pop. 24,500.

**Scylla**, a rock in the Strait of Messina, on the Italian side nearly opposite the whirlpool of Charybdis. Various legends were associated with Scylla and Charybdis, which were esteemed highly dangerous to navigators.

**Scythe**, an instrument used in mowing or reaping, consisting of a long, curving blade with a sharp edge, made fast at a proper angle to the lower end of a more or less upright handle, which is bent into a convenient form for swinging the blade to advantage. Most scythes have two short, projecting handles

fixed to the principle handle, by which they are held. The real line of the handle is that which passes through both the hands, and ends at the head of the blade. This may be a straight line or a crooked one, generally the latter, and by moving the short handles up or down the main handle, each mower can place them so as best suits the natural size and position of his body. For laying cut corn evenly, a *cradle*, as it is called, may be used. The cradle is a contrivance somewhat resembling a rake, with three or four long teeth so fixed to the scythe as to stretch the cut grain properly at each sweep of the scythe. A species of scythe which has been called the cradle-scythe is regularly used with the cradle for reaping in some localities. One form of scythe has a short, branching handle somewhat in the shape of the letter Y, having two small handles fixed at the extremities of the two branches at right angles to the plane in which they lie.

**Scythians**, a name very vaguely used by ancient writers. It was sometimes applied to all the nomadic tribes which wandered over the regions to the north of the Black and the Caspian seas, and to the east of the latter. In the time of the Roman Empire the name Scythia extended over Asia from the Volga to the frontiers of India. The people of this region, being little known, were the subject of numerous fables.

**Scythrops**, the channel bill, a genus of birds belonging to the cuckoo family. Only one species is known, a very handsome and elegantly colored bird inhabiting part of Australia and some of the Eastern islands, about the size of the common crow. It has a large and curiously formed beak, which gives it so singular an aspect that on a hasty glance it might almost be taken for a toucan or hornbill.

**Sea Anemone**, the popular name given to a number of animals, of the sub-kingdom Coelenterata and class Actinozoa, including the genus *Actinia* and other genera. They are among the most interesting organisms met with on the sea beach, and in aquaria form a great attraction. All sea anemones, however varied in coloration or form, present the essential structure and appearance of a fleshy cylinder, attached by its base to a rock or stone, and presenting at its free extremity the mouth, surrounded by a circlet of arms or tentacles. With these tentacles, which may be very numerous, in some cases exceeding 200 in number, they seize and secure their food—small crustacea, mollusks, such as whelks, etc.—which they paralyze by means of the thread cells common to them with all Coelenterata. The mouth leads into a stomach sac, which, however, is imperfectly specialized, and is such that a generalized idea of the structure of a sea anemone may be gained by supposing that the animal in transverse section represents a double tube, the outer tube corresponding to the body walls, and the inner tube to the stomach sac. When fully expanded the appearance of the anemones in all their varieties of color is exceedingly beautiful. But upon the slightest touch the

tentacles can be quickly retracted within the mouth aperture, the fluids of the body are expelled by the mouth, and the animal from presenting the appearance of a fully expanded flower, becomes a conical mass of jelly-like matter. Although these forms are attached to rocks and fixed objects, they appear able to detach themselves at will. The young are developed within the parent body, and appear in their embryo state as free-swimming, ciliated bodies of an oval shape. The sea anemones resemble the *Hydræ* in their marvelous powers of resisting injuries and mutilation. Thus if a sea anemone be divided longitudinally, a new animal will in due time be formed out of each half. They appear singularly insusceptible also to the action of hot or cold water, and seem to be wonderfully long lived. They are eaten as food in Italy, Greece, Provence, and on various other coasts.

**Sea Dragon**, a teleostean fish included among the Lophobranchii. The breast is very wide, and the large size of the pectoral fins, which form wing-like structures, together with its general appearance, have procured for this fish its popular name. The sea dragon occurs in Javanese waters. The dragonets, fishes of the goby family, are also known as sea dragons.

**Sea Eagle**, a name applied to one or two members of the eagle family; but probably with most distinctive value to the cinereous or white-tailed eagle or erne found in all parts of Europe. It is generally found inhabiting the sea coasts, and although living mainly upon fish, yet makes inland journeys in search of food, and seizes lambs, hares, and other animals. The head is covered with long, drooping feathers of ashy, brown color, while the body is of a dark brown hue, streaked in some places with lighter tints, and having the primary feathers of the wing mostly black. The tail is rounded, and is of white color in the adult, but brown in the young bird. The American baldheaded eagle, from its frequenting the sea coasts, is named the sea eagle. The bird also breeds in Shetland and in the Hebrides. Its average size appears to be about 3 ft. in length, and from 6 to 7 ft. in expanse of wings.

**Sea Hare**, the name of a genus of mollusca. These animals are slug-like in appearance, and derive their popular name from the prominent character of the front pair of tentacles, which somewhat resemble the ears of a hare. The shell is either absent or is of very rudimentary character, and is concealed by the mantle. Four tentacles exist, and the eyes are situated at the base of the hinder tentacles. The sea hares are widely distributed throughout most seas, and generally inhabit muddy or sandy tracts. They emit a fluid of a rich purple hue, which, like the ink of the cuttlefishes, has the property of diffusing itself quickly throughout the surrounding water. They are also known to discharge an acrid fluid of milky appearance, which has an irritant effect on the human skin.

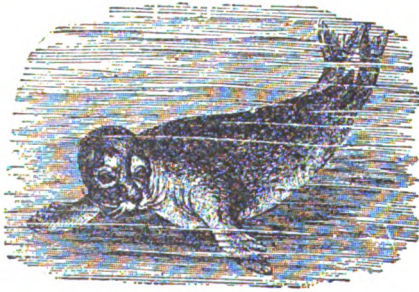
**Seal**, an engraved stamp bearing a device or inscription pertaining to the owner; also, the impression of such a stamp on a plastic sub-



## Seal

stance as wax. A seal upon a document was originally a substitute for a signature; a seal upon a place of deposit answered the purpose of security in a different manner from a lock. The use of seals is of the highest antiquity, and one of the earliest and commonest forms is the signet ring. In Egypt impressions of seals were made in fine clay, and attached to documents by slips of papyrus. The Romans used clay, beeswax, and in the time of the empire lead for taking impressions. In the time of Constantine flat metal seals, called *bullæ*, were used. The metals used were gold, silver, and lead, and the *bullæ* were attached to documents by silk or woollen bands. The leaden seal was adopted by the popes. The western monarchs generally used *bullæ* up to the sixteenth century. The use of beeswax was introduced by the Normans; sealing wax was invented in the seventeenth century. Each state has a seal, with a distinct device or legend. The attestation of deeds and other documents by a notary's seal stamped upon the paper is customary.

**Seal**, the name applied collectively to certain genera of mammals, in which the feet exist in the form of swimming paddles. Two distinct groups of seals are defined by zoologists, the *Phocidae* or common or true seals, and the *Otariidae* or eared seals. The *Phocidae*, or true or hair seals, have a body of fish-like contour. They have no external ear, and the hind limbs are permanently stretched out behind the body and parallel with the tail, a conformation obviously inappropriate and unsuited for supporting the body for locomotion on land, but admirably adapted for swimming. Five toes exist on each foot, and the middle digits of the hinder feet are much shorter than the outer ones. The toes, which are provided with claw-like nails, are united by a web of skin, and so form effective swimming paddles. The fore limbs are mere flippers. The fur generally consists of a dense thick under fur



Common Seal; attitude when swimming.

and of an outer coat of longer and coarser hairs. The bones are of light spongy texture, and beneath the skin is a thick layer of blubber or fat. The eyes are large and intelligent, and the sense of smell is also well developed. The sense of touch appears to reside chiefly in the "whiskers" of the face. The brain is of large size in proportion to the body, and when domesticated seals exhibit a very high degree of

## Seal

intelligence. They are polygamous, and seldom produce more than two young at a birth, one being the common number. They occur in almost all seas except those of tropical regions. In the northern regions they are more especially plentiful. They are largely hunted for their skins, which are converted into leather, and for their blubber, from which a valuable oil is obtained. The common seal is found widely throughout the northern regions,



Harp Seal.

and also around the more northern coasts of Britain. Its average length is from 3 to 5 ft., and the fur is a grayish-brown, mottled with black. It is very destructive to most of the food fishes. It is much attached to its young, and is strongly attracted by musical sounds. It is never met with in large numbers, or far away from the land. Closely allied to the common seal is the marbled seal, met with on some of the European coasts. The harp seal, Greenland seal, saddleback, or atak, inhabits almost all parts of the Arctic Ocean. The males average 5 ft. in length, are colored of a tawny gray, and on the back there is a dark mark resembling a harp or saddle in shape. In the spring, at breeding season, these seals resort in immense herds to the floes of the Arctic Ocean, around Jan Mayen Island, where great numbers of them are killed annually by crews of the sealing vessels. The great seal, which measures 8 or 10 ft. in length, occurs in Southern Greenland. The gray seal attains a length of from 8 to 9 ft., and is found on the Scandinavian and Icelandic coasts. The genus *Stenorhynchus* is represented by several species of the Southern Seas, and by the monk seal of the Mediterranean, which attains a length of from 10 to 12 ft., and seems to have been the seal best known to the ancients. The genus *Cystophora* includes the large bladder-nose, hooded or crested seal of the Greenland seas, in which the nose of the males has a curious distensible sac, and which attains an average length of from 10 to 12 ft. It also includes the large sea elephant, elephant seal, or bottle-nosed seal of the Antarctic Seas, which attains a length of from 20 to 30 ft.

The "eared" seals are distinguished by the possession of a small outer ear, by a longer neck, better developed limbs, and a structural relationship which presents a much nearer affinity to that of the bears. Of these the

## Sea Lemon

northern sea lion, so called from the mane of stiff, crisp hairs on its neck and shoulders, is a native of the Pribyloff Islands and other parts of Alaska. The sea bear or fur seal extends south of the equator from near the tropics to the antarctic regions. It was very abundant at the Falkland Islands early in the nineteenth century, but has almost been exterminated there. It is now sought for chiefly at St. Paul's and St. George's Islands, of the Pribyloff group, off the coast of Alaska, and at the Commander Islands in the Bering Sea. The species found here is the northern fur seal. It visits those islands, making its appearance from the southward late in the spring, chiefly for reproductive purposes, leaving again about the end of October or beginning of November. Each old male mates with ten or fifteen or more females, whom he guards jealously, and in whose behalf he fights furiously. The female gives birth to one pup. The male attains maturity about the eighth year, when its length is from 7 to 8 feet, and its weight from 500 to 700 lbs. The outer and longer hairs of its fur are of a grayish brown color, the thicker under fur being darker or reddish brown; and it is this fine under fur which, when stripped of the coarse outer hairs and dressed by the furrier, affords one of the most beautiful and valued of the "sealskins" of commerce.

The seal fisheries are divided into hair-seal fisheries and fur-seal fisheries. The principal seats of the hair-seal fishery are Newfoundland, Jan Mayen, and the Caspian Sea. Nearly half the total number of seals obtained is taken on the Newfoundland coast. The Jan Mayen fishery is carried on by the British, Norwegians, Swedes, Danes, and Germans. The seals are taken either by clubbing them or shooting them when congregated on the ice. The species taken are the same as those on the Newfoundland coast, the harp or saddleback and the hood or bladder nose. The skins are salted, and the fat is stowed into tanks, and manufactured into oil when the vessels reach home in the autumn. The blubber of about 100 seals yields a ton of oil. Owing to the reckless way in which the fishery has been conducted, seals have greatly diminished in numbers of late years in localities where they were formerly plentiful; but a "close season" has now been established both in the Newfoundland fishery and the Jan Mayen fishery. The fur-seal fishery is carried on chiefly at St. Paul's and St. George's Islands, Pribyloff Islands, Alaska, and Commander Islands, Bering Sea, all which are leased by the Alaska Commercial Company of San Francisco. It is also carried on at the Straits of Juan de Fuca, at the Lobos Islands, mouth of Rio de la Plata, at the South Shetland Islands and Straits of Magellan, and at the Cape of Good Hope. The total number of fur seals taken annually is estimated at from 150,000 to 200,000, representing a value of about \$3,500,000.

**Sea Lemon**, a genus of mollusca. It is destitute of a shell, and moves by means of a broad ventral foot. The gills exist in the form of a circle of plumes in the middle of the

## Seamen

back, at the posterior extremity of the body, and can be retracted at will within the body. The name sea lemon has been applied to these mollusks from their usually yellow color and somewhat lemon-like shape. They may be found at low water-mark under stones and in similar situations. The "sea lemon" par excellence is about 3 in. in length, of a yellow color, and having the mantle warty.

**Sealing Wax**, a resinous preparation used for securing folded papers and envelopes, and for receiving impressions of seals set to instruments. Ordinary red sealing wax is made of pure bleached lac, to which when melted are added Venice turpentine and vermilion. Inferior qualities consist of a proportion of common resin and red lead, and black and other colors are produced by substituting appropriate pigments. Sealing wax was invented in the seventeenth century.

**Sealkote** (or Sialkot), a town of India in the Punjab, 72 mi. n.e. of Lahore, is the scene of a famous annual fair, and a local trade center of rising importance. The manufactures are paper and cloth. Pop. (including military cantonment) 45,762.

**Seal Leather**, a leather manufactured from sealskins. It is light, strong, and tough, and is finished either in a large coarse grain for bootmakers, or as an enameled or japanned leather.

**Sea Mat** (or Hornwrack), a genus of mollusca. The sea mat, which presents the appearance of a piece of pale brown seaweed, is a compound organism, produced by a process of continuous gemmation or budding from a single primitive polypide, which latter was in turn developed from a true egg.

**Seamen, LAWS RELATING TO**, in the American merchant service shipping articles are agreements in writing or print between the master and seamen or mariners on board of his vessel (except such as shall be apprenticed or servant to himself or owners), declaring the voyage or voyages, term or terms of time for which such seaman or mariners shall be shipped. It is also required that at the foot of every such contract there shall be a memorandum, in writing, of the day and the hour on which each seaman or mariner, who shall so ship and subscribe, shall render himself on board to begin the voyage agreed upon. For want of shipping articles the seaman is entitled to the highest wages which have been given at the port or place where such seaman or mariner shall have been shipped for a similar voyage, within three months next before the time of such shipping, on his performing the service, or during the time he shall continue to do duty on board such vessel without being bound by the regulations, or subject to the penalties or forfeitures contained in act of Congress; and the master is further liable to a penalty. Shipping articles ought not to contain any clause which derogates from the general rights and privileges of seamen; and if they do the clause will be declared void. A seaman who signs shipping articles is bound to perform the voyage, and he has no right to elect to



## Sea Mouse

pay damages for non-performance of the contract.

**Sea Mouse**, a genus of marine worms. The most notable feature in connection with the sea mouse consists in the beautiful iridescent hues exhibited by the hairs or bristles which fringe the sides of the body. The sea mouse inhabits deep water, and may be obtained by dredging, although it is frequently cast up on shores after storms.

**Sea Pass**, a passport carried by neutral vessels in time of war to prove their nationality, and so secure them from molestation.

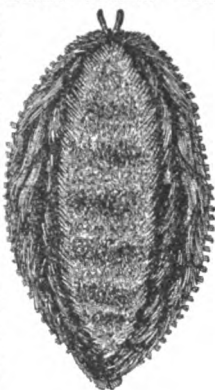
**Search**, RIGHT OF, in maritime law, the right claimed by a nation at war to authorize the commanders of their lawfully commissioned cruisers to enter private merchant vessels of other nations met with on the high seas, to examine their papers and cargo, and to search for enemy's property, articles contraband of war, etc.

**Search Warrant**, in law, a written authority granted by a magistrate to a legal officer to search a house or other place for property alleged to have been stolen and suspected to be secreted in the place specified in the warrant. Similar warrants are granted to search for property or articles in respect of which other offenses are committed, such as base coin, coiners' tools, explosives, liquors, etc., kept contrary to law.

**Sea Serpent**, a marine serpentine form of large size, or sea monster of doubtful character, frequently alleged to have been seen. From the numerous substantiated accounts of animals of one kind or another, but differing from all described and known forms, having been seen, often close at hand, by the crews and passengers of ships, and by respectable observers on land, we are confined to the choice, either of believing that in every case the senses of the observer must have been mistaken, or that some living form must have been seen in the majority of cases. Careful research, and the weighing of the evidence presented in the accounts of "sea-serpent" phenomena, show that the subject demands, at least, investigation.

**Seaside Grape**, a small tree which grows on the sea coasts of Florida and the West Indies. It has clusters of edible fruit somewhat resembling the currant in appearance, a beautiful hard wood which produces a red dye, and yields the extract known as *Jamaica kino*.

**Sea Snake**, a name common to a family of snakes of several genera. These animals frequent the seas of warm latitudes. They are found off the coast of Africa, and are plentiful in the Indian Archipelago. They are all, so far as known, exceedingly venomous. They de-



Sea Mouse.

## Sebastian

light in calms, and are fond of eddies and tide ways, where the ripple collects numerous fish and medusæ, on which they feed.

**Seasons**, the four grand divisions of the year—spring, summer, autumn, winter. These have distinctive characters, best seen in the temperate zones. Within the tropics they are not so much marked by differences of temperature as by wetness and dryness, and are usually distinguished as the wet and dry seasons. Astronomically speaking, spring is from the vernal equinox, when the sun enters Aries, to the summer solstice; summer is from the summer solstice to the autumnal equinox; autumn is from the autumnal equinox to the winter solstice; winter is from the winter solstice to the vernal equinox. The characters of the seasons are reversed to the inhabitants of the southern hemisphere.

**Sea Spider** (or Spider Crab), a marine crab. Its body is somewhat triangular in shape, and its legs are slender and generally long. It lives in deep water, and is seldom seen on the shore.

**Sea Squirts**, a name sometimes applied collectively to all the Tunicata. The name "sea squirts" has been applied from their habit of emitting jets of water from the orifices of the body when touched or irritated in any way.

**Sea Surgeon** (or Surgeon Fish), so named from the presence of a sharp spine on the side and near the extremity of the tail, bearing a resemblance to a surgeon's lancet. It occurs on the Atlantic coasts of South America and Africa, and in the Caribbean Sea. Its average length is from 12 to 19 in.

**Seattle**, King co., Wash., on Puget Sound. Railroads: Northern Pacific; S. L. S. & E.; Columbia & Puget Sound. It is the largest city in the state. Industries include iron works, sawmills, sash, door, and furniture factories, brickyards, etc. Exports 500,000 tons of coal annually; also oats, hops, lumber, fruits, fish, etc. Pop. 1900, 80,671.

**Sea Wolf**, a genus of fishes (also known by the names "sea cat" and "swine fish"). The mouth is armed with sharp, strong teeth of large size, and when captured it is said to bite the nets and even attack the fishermen. It is the largest of the blennies. Around the coasts of Britain it attains a length of 6 or 7 ft., but in more southern seas it is said to grow to a still larger size. The flesh is palatable, and is largely eaten in Iceland, while the skin is durable, and is manufactured into a kind of *sha-green*, used for making pouches and like articles.

**Sebas'tian**, Dom (1554-1578), king of Portugal, posthumous son of the Infant John and of Joanna, daughter of Charles V, ascended the throne in 1557, at the death of his grandfather, John III. In 1578 he led the flower of his nobility into Africa on a wild expedition against the Moors, and perished in battle with nearly all his followers. He had no immediate heir, and Portugal was soon annexed by Philip II of Spain, but the masses of the people refused to believe in his death, and several pretenders to his name and claims received a measure of popular support. The belief in the future re-



## Sebastopol

turn of Dom Sebastian lingered long in Portugal, finally taking the form of a myth, and giving rise to a considerable literature of poems and romances.

**Sebas'topol**, a Russian town and naval station on the Black Sea, in the southwest of the Crimea. The town lies chiefly on the south side of a large and deep inlet of the Black Sea running east for a distance of nearly 4 mi., with an average width of  $\frac{1}{2}$  mi., narrowing to 930 yds. between the promontories at its mouth, and a depth of from 6 to 10 fathoms. Sebastopol has grown up since 1780, when it was a mere Tartar village. On the outbreak of the Crimean War, when the population amounted to 43,000, it became the point against which the operations of the allies were mainly directed, and its siege forms one of the most remarkable episodes in modern history. The town, then utterly destroyed, has been reconstructed, and though the treaty of Paris stipulated that no arsenal should exist on the Black Sea, and that the town should not again be fortified, these obligations have been repudiated by Russia, and it bids fair to exceed its former importance. Railway communication with Moscow has greatly improved the trade. Pop. 26,058.

**Sebes'ten**, Asiatic trees of the borage order. The fruit is edible, and was formerly employed in European medicine, but now only by the practitioners of the East. It is mucilaginous and somewhat astringent.

**Secchi** (sek'kē), ANGELO (1818-1878), Italian astronomer, was b. at Reggio in Lombardy; entered the order of Jesuits in 1833, and in 1849 was appointed director of the observatory of the Collegio Romano at Rome, a post which he held till his death. Father Secchi gained a great reputation by his astronomical researches, especially by his meteorological observations and spectroscopic analyses both of stars and of the sun. His three most popular works are *L'Unité des Forces*, *Physiques*, *Le Soleil* (*The Sun*), and *Le Stelle* (*The Stars*).

**Secessionist**, one who maintains the right of a state included under the Constitution of the U. S. to withdraw from the Union and set up an independent government; specifically, one who took part or sympathized with the inhabitants of the Southern states during the Civil War.

**Seck'endorf**, FRIEDRICH HEINRICH, COUNT VON (1673-1763), imperial field marshal, b. at Königsberg, in Franconia. He adopted the military profession and served in the war of the Spanish Succession. On the death of Prince Eugene, 1736, he became commander in chief of the Austrian army against the Turks, but being unsuccessful, was recalled, tried by court martial, and imprisoned in the fortress of Gratz, from which he was liberated in 1740. He then took service with the elector of Bavaria, who had just been elected as Charles VII, emperor of Germany, and as commander of the Bavarian forces relieved Munich and drove back the Austrians into Bohemia.

**Secretary Bird**, the sole representative of

## Secretion

the genus *Serpentarius*, order Accipitres or birds of prey. It derives its popular name from the peculiar plumes of feathers which project from the back and sides of its head, and give it the appearance of having bundles of pens stuck behind each ear. It has very long legs, and stands nearly 4 ft. in height. The wings are elongated, and carry a blunt spur on the shoulder, the third, fourth, and fifth quills being the longest. The tail is also very long, and wedge-shaped, the two middle feathers projecting beyond the others. The skin around the eyes is destitute of feathers. The general color is a slaty gray, the pen-like feathers of the head being black, as also are the feathers of the tibiae and the primaries of the wings. The secretary bird can fly with ease when once it takes wing, but it seems to prefer the ground. It is found over the greater part of Africa, especially in the



Secretary Bird.

south. As a foe to venomous snakes it is encouraged and protected in South Africa, where it is frequently brought up tame.

**Secretary of State**, an officer whose business is to superintend and manage the affairs of a particular department of government. In the U. S. the secretary of state (with three assistant secretaries) is at the head of the department of foreign affairs, and the first officer in the cabinet. See *United States*.

**Secretion**, in animal physiology, is the separation of certain elements of the blood, and their elaboration to form special fluids, differing from the blood itself or from any of its constituents, as bile, saliva, mucus, urine, etc. Secretion is performed by organs of various form and structure, but the most general are those called glands. Of these glands the essentially active parts are the cells, which elaborate from the blood a peculiar fluid in each instance predetermined by the inherent function of the gland or organ of which the cells are integral parts. The chief general conditions which variously affect secretion are the quantity and quality of the blood traversing the gland and the influence of the nervous system. Mental conditions alone, without material stimuli, will excite or suppress secre-

## Secular Games

tion; but this is a branch of the subject which is yet ill-understood.

Secretion, in vegetable physiology, is the separation of certain elements from the sap, and their elaboration by particular organs. These secretions are exceedingly numerous, and constitute the great bulk of the solid parts of plants. They have been divided into 1, *General or nutritious secretions*, the component parts of which are gum, sugar, starch, lignin, albumen, and gluten; and 2, *Special non-assimilable secretions*, which may be arranged under the heads of acids, alkalies, neutral principles, resinous principles, coloring matters, milks, oils, etc.

**Secular Games**, a great festival, probably of Etruscan origin, anciently celebrated at Rome to mark the commencement of a new *saeculum* or generation. In 249 B. C. it was decreed that the secular games should be celebrated every hundredth year after that date; but this decree was frequently disregarded.

**Secularism**, a philosophy of life, the gist of which consists in the advocacy of free thought and the assertion of some corollaries derived from this leading tenet. Secularists are convinced that the best means of arriving at the truth is to place perfect confidence in the operations of human reason. They do not hold human reason to be infallible, but they maintain that it is in the interest of truth that reason should be corrected only by reason, and that no restraint whatever, penal, moral, or social, should be placed upon holding, expressing, or acting up to any opinion intelligently formed and sincerely held, however contrary that opinion may be to those generally current. Skepticism or the questioning of traditional beliefs they regard as a moral duty; yet their creed cannot be called a skeptical one, for they do not rest satisfied with doubting, but when they find that certainty, that is, irresistible conviction, is unattainable on any subject, they consider that they should confess their ignorance with regard to it, and pass on to other subjects that may be investigated with more profitable results. From the nature of their leading tenet it follows that the only moral principles they can hold are such as they believe must commend themselves to the reason and aspiration of every man of enlightened conscience. The foundation of such a set of moral principles they profess to find in the doctrine of Utilitarianism, which regards it as our highest duty to do all that tends to bring every individual to the highest perfection of which human nature is capable. The means to do this is, they think most likely to be found in the study of man's whole nature, physical, moral, and intellectual, and of the laws of external nature, and these are the objects to which they direct attention. Secularism does not come into direct collision with any religion. It is not atheistic, inasmuch as it is no tenet of that system either to affirm or deny the existence of God; nor does it deny the truth of Christianity, for that is none of its business any more than it is to affirm or deny some scientific theory.

## Seduction

**Secunderbad** (or Sikandarabad), British military cantonment in India, in the Nizam's dominion, 6 mi. n.e. of Hyderabad. It is the largest military station in India, covering a total area of 19 sq. mi., including many interspersed villages, and forms the headquarters of the Hyderabad subsidiary force, which constitutes a division of the Madras army. Pop. 71,124.

**Sedaine** (sè-dān), MICHEL JEAN (1719-1797), dramatist, b. at Paris. He is regarded as the founder of comic opera. Two of his comedies, *Le Philosophe sans le Savoir* and *La Gageure Imprévue*, still hold the stage, and are ranked among the best French plays.

**Sedalia**, Pettis co., Mo. Railroads: M. K. & T., and Missouri Pacific. Center of an agricultural and coal mining district. Industries include foundries and boiler works, flour and woolen mills, mattress factory, furniture works, and railroad machine shops. Pop. 1900, 15,231.

**Sedan**, BATTLE OF. See *Franco-German War*.

**Sedge**, an extensive genus of grass-like plants, containing thousands of species, mostly inhabiting the northern and temperate parts of the globe. The greater proportion of the species are marsh plants. The stems are usually triangular, without joints. The sedges, in general, are of but little utility to man. They furnish coarse fodder, which is rejected by most of the domestic quadrupeds. The decomposed roots and leaves contribute largely to turn the soil of marshes into peat.

**Sedge Warbler**, a species of insessorial bird of the warbler family, which frequents the sedge banks of rivers. More than fifty species of warblers are found in the U. S.

**Sedgwick**, CATHERINE MARIA (1789-1867), writer, was the daughter of Judge Theodore Sedgwick, and was b. at Stockbridge, Mass. She conducted a private school for the education of young ladies for fifty years. She published her first work of fiction, *A New England Tale*, in 1822, and two years later brought out *Redwood*, which was compared favorably with the novels of Cooper and translated into several European languages. Other works of hers were: *The Traveler*, *Hope Leslie*, *Clarence*, *The Story of Le Bossu*, *The Linwoods*, *Letters from Abroad*, *Historical Sketches of the Old Painters*, etc. She was a prolific writer, and contributed much to the annuals and magazines.

**Sedley**, SIR CHARLES (1639-1701), one of the "wits" of the Restoration period, and a great favorite with Charles II, was the son of Sir John Sedley of Aylesford, Kent. He wrote comedies and songs; of the latter one or two are still popular, but the former are not equal to his reputation. His first comedy, *The Mulberry Garden*, was published in 1668. In later life he entered Parliament, and took an active part in politics.

**Seduction**, in law, the act of persuading a female, by flattery or deception, to surrender her chastity. The statutory rule which prevails widely in the U. S. rests both the right and remedy where the wrong is inflicted, in the family and parental relations. The action is therefore brought in the case of an unmar-

ried woman by the parent (or guardian) as the head of the family, and in the case of a married woman by the husband.

**Seed**, the impregnated ovule of a plant. It consists essentially of two parts, namely, the nucleus or kernel, and the integuments. The latter consists of two seed-coats—the outer named the *epispem* or *testa*, the inner the *tegmen* or *endopleura*; and the two together are sometimes termed the *spermoderm*. The testa of some seeds is furnished with hairs, which cover the entire surface, as in various species of *Gossypium*, where they constitute the material called cotton; or they may be confined to certain points of the surface, as in the willow, *Epilobium*, etc.; while in the pine the testa forms a wing. On the outside of the integument of the seed there is sometimes an additional partial covering, which has received the name of *aril*, and in the nutmeg forms the mace. The nucleus or kernel of the seed is the fully developed central portion of the ovule. It consists either of the embryo alone, as in the wallflower, or of the embryo along with a separate deposit of nourishing matter called albumen, as in the cocoanut and wheat. The embryo is the young plant contained in the seed, and is the part to the development of which all the reproductive organs contribute. It consists of a general axis, one part of which is destined to form the root, the other to form the stem. The axial portion is provided with fleshy organs called cotyledons or seed-leaves, which serve to nurse the young plant before the appearance of the true leaves. Plants possessing one cotyledon are termed monocotyledonous, those having two are denominated dicotyledonous, and plants having only a cellular embryo, as in the cryptogamic or flowerless plants, are called acotyledonous. When seeds are contained in an ovary, as is usually the case, the plants are called *angiospermous*; when the seeds are not contained in a true ovary, with a style or stigma, the plants are called *gymnospermous*, as conifers.

**Seeley**, JOHN ROBERT (1834–95), English scholar and writer, was b. in London, where his father was a publisher, and was educated at the City of London School and at Christ's College, Cambridge. In 1869 he succeeded Charles Kingsley in the chair of modern history at Cambridge. In 1865 appeared a work, *Ecce Homo*, or the *Life and Work of Jesus Christ*, of which Professor Seeley has always been regarded as the author. It created a profound sensation at the time of its appearance; but *Natural Religion* by the author of *Ecce Homo*, attracted much less attention. Among Professor Seeley's avowed works are *Life and Times of Stein*, or *Germany and Prussia in the Napoleonic Age*; *The Expansion of England*; and *A Short Life of Napoleon the First* (1886).

**Seer**, the standard measure of weight in India, but varying in different parts of the country. The imperial or standard seer is 2.205 lbs., exactly equivalent to the metrical kilogramme; it is the fortieth part of a maund. As a standard liquid measure the seer is equal to about 6 gills.

**Se-gan Foo**, the capital of the province of Shen-se, in the northwest of China. It was long the capital of the empire, and is still of great importance, silk, tea, and sugar being the principal articles of commerce. Pop. est. at about 1,000,000.

**Sego** (or Segoo), the capital of a Fulah kingdom of the same name (now in the French "sphere of influence"), in the Bambarra country, Western Africa, on the Upper Niger. The kingdom consists mainly of an alluvial plain of great fertility on the right bank of the river, extensively flooded during the rainy season. The capital is surrounded by earth walls, and has two-storied white mud houses with flat roofs. Pop. 30,000.

**Séguin** (sè-gap), EDOUARD (1812–1880), b. in France, studied medicine and surgery, devoted himself specially to the study of idiocy and the training of idiots, settled in the U. S. after the revolution of 1848. He achieved remarkable results in his treatment of idiots, and his writings on the subject hold the position of text books.

**Séguir** (sā-gür), LOUIS PHILIPPE, COMTE DE SEGUR-D'AGUESSEAU (1753–1830), served in America under Rochambeau, and after the peace of 1783 was ambassador to St. Petersburg. In 1792 he was sent to Berlin; but after the execution of the king he retired from public affairs. His principal works are *Théâtre de l'Hermitage*, originally written for the private theater of Catherine II; *Tableau Historique et Politique de l'Europe de 1786 à 1796*; *Historie Ancienne*; *Historie Romaine*; *Mémoires*.

**Seidlitz Powders**, an aperient medicine, named after the Seidlitz spa in Bohemia. These powders are usually put up in blue and white paper, the blue containing tartrate of soda and potash (Rochelle salt) with bicarbonate of soda, and the white tartaric acid. The former is dissolved in half a tumbler of water, and the acid powder is then added, which produces effervescence, and the draught is taken while the effervescence is going on.

**Seine** (sen or sän), a river in France, which rises on the Plateau de Langres, dep. of Côte-d'Or, 20 mi. n.w. of Dijon. It flows generally in a northwest direction; receives on the right the Aube, Marne, and Oise, and on the left the Yonne and Eure; and after a somewhat tortuous course falls into the English Channel between Honfleur and Havre. Its total length is 480 mi., and 250 mi. in a direct line; and its basin has an area of about 30,000 sq. mi.

**Seine**, a department in France, completely enclosed by the department of Seine-et-Oise, and at once the smallest and most populous of the French departments, including as it does the city of Paris. Area 185 sq. mi.; pop. 2,961,089. The department has three arrondissements (Paris, St. Denis, and Sceaux), twenty-eight cantons (twenty in Paris), and forms the archiepiscopal diocese of Paris.

**Seine-et-Marne** (sen-e-märn), a French department in the basin of the Seine and Marne, east of Seine-et-Oise. Area 2,215 sq. mi.; pop. 355,136. Cereals occupy two fifths of the department, and forests (the most important of



which is the forest of Fontainebleau) one fifth. There are quarries of excellent building stone, and beds of common clay and porcelain clay, which supply the potteries of Fontainebleau and Montereau. The capital is Melun.

**Seine-et-Oise** (sen-e-wäz), a French department, in the basin of the Seine and Oise, enclosing the department of Seine. Area 2,163 sq. mi.; pop. 618,089. Seine-et-Oise is a great agricultural and horticultural department, with numerous industrial establishments, including the national porcelain factory at Sèvres. There are valuable quarries of building stone, pavement, millstones, and extensive beds of porcelain and potters' clay. The capital is Versailles.

**Seine-Inférieure** (sen-ā-fā-ri-*eur*), a maritime department of France, on the English Channel, south of the estuary of the Seine. Area 2,330 sq. mi.; pop. 833,386. The department is in general fertile and well cultivated, the principal crops being oats, wheat, and potatoes. There are numerous orchards, from which vast quantities of cider are made. Manufactures are extensively carried on, Rouen being the seat of the cotton trade and Elbœuf of the woolen trade. Havre, Rouen, and Dieppe are the principal ports for foreign trade. The coast fisheries are productive. The capital is Rouen.

**Seismometer**, an instrument for measuring the force and direction of earthquakes and other earth movements. It records both the horizontal and vertical movements by means of an index, the record being traced on smoked glass. There are various forms of seismometer or seismograph. One which is used in the observatory on Mount Vesuvius consists of a delicate electric apparatus, which is set to work by the agitation or change of level of a mercurial column, which records the time of the first shock, the interval between the shocks, and the duration of each; their nature, whether vertical or horizontal, the maximum intensity; and in the case of horizontal shocks the direction is also given.

**Selangor**, a native state of the Malay peninsula, south of Perak, under the protection of the British colony of the Straits Settlements; area 3,000 sq. mi. It yields tin, gutta-percha, etc. Since 1880 the British resident resides at Kwala Lumpur, 22 mi. distant from Klang, the principal port, with which it is connected by railway. The sultan resides at Jugra. Pop. 50,000, more than half of whom are Chinese.

**Selectmen**, in New England, officers chosen annually to manage the affairs of a town, provide for the poor, etc. A town has usually from three to seven selectmen, who constitute a kind of executive authority.

**Sele'nē**, in Greek mythology, the goddess of the moon, daughter of Hyperion, and sister of Helios (the sun) and Eos (the dawn). She was also called Phœbe, and in later times was identified with Artemis. In art she is often represented as a beautiful woman with large wings, a long robe, and a coronet.

**Selenium**, a rare chemical element discovered by Berzelius in 1817 in the refuse of a

sulphuric acid manufactory near Fahlun, in Sweden. It occurs in several minerals, chiefly in combination with copper, lead, mercury, and silver, and is closely related, in its general chemical deportment, to sulphur and tellurium, these three elements forming a group which is characterized by certain well-marked general properties. Selenium takes fire when heated to a tolerably high temperature in air or in oxygen, burning with a blue flame, and with the production of the dioxide. With hydrogen selenium forms the very disagreeably smelling gas, *seleniureted hydrogen*, the analogue of sulphureted hydrogen. To selenium the symbol Se and the atomic weight 96.5 are given.

**Seleucia**, the name of several cities in Asia, founded by Seleucus Nicator. The most celebrated was Seleucia-on-the-Tigris, the eastern capital of the Seleucidæ, about 30 mi. from Babylon. It was one of the richest commercial cities of ancient times, counting about 600,000 inhabitants, chiefly Greeks. Taken by the Parthians 140 B. C., and sacked by Trajan 116 A. D., it was soon deserted and became as desolate as Babylon itself. The next in importance was Seleucia Pieria, founded 300 B. C., and situated on the sea coast at the foot of Mount Pieria, 12 mi. w. of Antioch, of which it was the seaport, and which it rivaled in splendor.

**Seleucidæ**, a dynasty of kings who succeeded to that portion of the empire of Alexander the Great which embraced the Asiatic provinces, and is generally known as Syria. SELEUCUS I (358-280 B. C.), surnamed *Nicator*, the founder of the line, was a general of Alexander the Great, shortly after whose death (323 B. C.) he obtained the satrapy of Babylon. Subsequently Antigonus forced him to withdraw into Egypt (316 B. C.), but having induced Ptolemy, the governor of Egypt, along with Lysimachus and Cassander, to take the field against Antigonus, he was enabled to return to Babylon in 312 B. C. He gradually extended his possessions from the Euphrates to the Indus, assumed the title of king in 306, and latterly acquired Syria and the whole of Asia Minor, but he was assassinated. He is said to have been the most upright of Alexander's successors, and was the founder of Antioch and other cities. He was succeeded by his son Antiochus I and by a number of monarchs of the name of Seleucus and Antiochus, the most distinguished being Antiochus the Great. The power of the Seleucidæ began to decline as early as the reign of Seleucus II (246-226 B. C.), and they successively lost, through revolts and otherwise, Bactria, Parthia, Armenia, Judea, etc., and what subsequently remained was converted into a Roman province in 65 B. C.

**Selim I** (1467-1520), sultan of Turkey. The people, pleased with his warlike disposition, raised him to the throne in place of Bajazet, who was afterward poisoned, as were also the brothers and nephews of Selim. In 1514 he entered upon a war with Persia and obtained large accessions of territory. He next directed his arms against the Mamelukes of Egypt, and in 1516-17 became master of Syria and Egypt.

### Selim III

The title of *imam* and the standard of the Prophet were at this time granted to Selim by the last descendant of the Abbasside Caliphs in Egypt, and in consequence the sultans of Constantinople became the chiefs of Islam, the representatives of Mohammed. Selim was succeeded on the throne by Solyman I.

**Selim III** (1761-1808), sultan of Turkey, son of Mustapha III. He succeeded his uncle Abdul-Hamed in 1789, and attempted reforms in his government after European methods, but wars with Russia, Austria, etc., prevented their being carried out. In 1791 Selim was compelled to cede Choczim to Austria, and a year later he signed the Peace of Jassy, by which Russia acquired all Turkish possessions beyond the Dniester. Selim entered with great ardor upon his system of reforms; but the fanatic zeal of the people, kindled by the preaching of the dervishes, burst into open revolt, and he was deposed by the Janizaries (1807). An attempt to regain his throne ended in his murder. Selim's efforts for the reformation of Turkey were not altogether fruitless, for manufactures had begun to flourish, and generally a number of improvements calculated greatly to benefit the nation were effected.

**Seli'nus**, one of the most important of the Greek colonies in Sicily, founded probably about 628 B.C. on the s.w. coast of that island. Thucydides mentions its great power and wealth, and the rich treasures of its temples. It was conquered by the Carthaginians in 409, and in 249 destroyed by them. There are still important ruins of ancient Greek temples here, and valuable sculptures belonging to them have been preserved.

**Selkirk** (or Selkirkshire) (formerly known as *Etrick Forest*), is an inland county, bounded by Midlothian, Roxburgh, Dumfries, and Peebles; area 164,545 acres. The arable land occupies about one eighth of the area, and produces the ordinary cereals and green crops. Large numbers of sheep are reared, the Cheviots being now the prevailing breed. The chief river is the Tweed. Among interesting historical scenes in the county are the field of Philiphaugh; Oakwood Towers, the reputed residence of Michael Scott, the wizard; and Newark Castle, the scene of Scott's *Lay of the Last Minstrel*. Other places of interest are St. Mary's Loch and the Loch of the Lowes, midway between which is the monument to the Etrick Shepherd. Woolens are largely manufactured, chiefly in Selkirk, the capital of the county, and in Galashiels. Pop. 27,349.

**Selkirk** (1676-1723) (or Selcraig), ALEXANDER, the prototype of *Robinson Crusoe*, was b. in Largo, Fifeshire. He took part in buccannering expeditions in the South Seas, and in consequence of a quarrel with his captain he was put ashore, at his own request, on the island of Juan Fernandez. There he lived alone for four years and four months, when he was taken off by the captain of a privateer. He returned home in 1712, and his adventures became known to the public. Defoe's *Robinson Crusoe* appeared in 1719, but Crusoe's experiences have but little in common with those

### Semiramis

of Selkirk. Selkirk afterward rose to the rank of lieutenant in the navy. A monument was erected to him in his native town in 1885.

**Selma**, county seat of Dallas co., Ala.; 50 m. w. of Montgomery; at the head of navigation on the Alabama river, and on the L. & N., the Mobile & Birmingham, the Southern, the Queen & Crescent and the West. of Alabama railroads. It is in a fine agricultural region and has a large trade in cotton, lumber, coal, iron and general merchandise. Selma has several cotton warehouses, railway machine shops and cotton mills. The city was a military center during the Civil War. It is the seat of Selma University (Baptist). Pop. 1900, 8,713.

**Sem'aphore**, a term originally applied to telegraphic or signaling machines, the action of which depended upon the motion of arms round pivots placed at or near their extremities. Many kinds of semaphores were in use before the invention of the electric telegraph, and a simple form is still employed on railways to regulate traffic at or near stations.

**Semele** (sem'e-lē), in Greek mythology, a daughter of Cadmus by Harmonia, and beloved by Zeus. Jealous of her husband's mistresses, Hera persuaded Semele to entreat her lover to attend her with the same majesty as he approached Hera. As he had sworn to gratify her every wish, Zeus, though horrified at this request, came to her accompanied by lightnings and thunderbolts, when Semele was instantly consumed by fire. Dionysus (Bacchus) was her son by Zeus.

**Sem'inoles**, a tribe of North American Indians, an offshoot from the Choctaw Muskogees. They separated from the Confederation of the Creeks, and settled in Florida in 1750, under the name of Seminoles, that is, fugitives. They were subsequently joined by other Indians as well as negroes, and in 1822 they numbered 3,900 souls. As a punishment for their continual plundering and murdering of the white settlers, General Jackson was sent against them in 1818. They latterly sold their lands and agreed to be transferred beyond the Mississippi, but they refused to fulfill their agreement, and under their chief Osceola carried on a long and determined resistance. At last they were finally driven from the Everglade morasses by U. S. troops, and obliged to succumb in 1842, when all but a scanty remnant were transferred to the Indian Territory, where they now form an industrious community of 2,500 souls.

**Semipalatinsk** (or Semipolatinisk), a province of Siberia, has an area of 198,192 sq. mi., and a population of 525,979, chiefly Kirghiz, Cossacks, etc. It is mountainous in the southeast, consists of steppe land in the northwest, and is one of the warmest regions of Russian Asia in summer, though the winter is rather extreme. The chief occupation of the people is cattle rearing.

**Semir'amis**, a queen of Assyria, whose history is enveloped in fable. As the story goes, she was a daughter of the fish-goddess Derceto of Ascalon, in Syria, by a Syrian youth. Being

exposed by her mother, she was miraculously fed by doves until discovered by the chief of the royal shepherds, who adopted her. Attracted by her beauty, Onnes, governor of Nineveh, married her. She accompanied him to the siege of Bactra, where, by her advice, she assisted the king's operations. She became endeared to Ninus, the founder of Nineveh (about 2182 B.C.), but Onnes refused to yield her, and being threatened by Ninus, hanged himself. Ninus resigned the crown to Semiramis, and had her proclaimed queen of Assyria. She built Babylon, and rendered it the mightiest city in the world. She was distinguished as a warrior, and conquered many of the adjacent countries. Having been completely defeated on the Indus, she was either killed or compelled to abdicate by her son Ninyas, after reigning forty-two years. According to popular legend she disappeared or was changed into a dove, and was worshiped as a divinity. She is probably a mythological being corresponding to Astarte, or the Greek Aphrodite.

**Semiretchinsk'**, a province of Russian Turkestan close to the Chinese frontier; area 155,300 sq. mi. It is mountainous in the south, but the northern part is flat and barren. Large herds of cattle are reared by the inhabitants, and agriculture is more or less developed in the southern district. Pop. 750,000.

**Semitic Languages**, the languages belonging to the Semites or Semitic peoples, that is, those regarded as descendants of Shem. The Semitic languages form an important linguistic family, which is usually divided into a northern and a southern section. To the northern belong the ancient dialects of Assyria and Babylonia (recovered by means of the cuneiform inscriptions); the Hebrew, with the Samaritan and Moabitic; the Phœnician and Carthaginian; and lastly the Aramaic, which includes the Chaldean and the Syriac. The northern Semitic languages are now almost entirely extinct as spoken tongues, though Hebrew is to some extent still used in writing. The most important of the south Semitic tongues, and the only one now in extensive use is the Arabic, which as a spoken language may be divided into the four dialects of Arabia, Syria, Egypt, and Barbary. To this branch also belong the Himyaritic, formerly spoken in part of Arabia, the Ethiopic, or ancient ecclesiastical language of Abyssinia, and the Amharic and other modern dialects of the same country. The most prominent characteristic of the Semitic tongues is the triliteralism of their roots, that is, the peculiarity that their roots regularly consist of three consonants which always remain unchanged, the various words and word forms being produced by the insertion of vowels between the consonants of the root. Another peculiarity is the absence of compound words.

**Semmes**, RAPHAEL (1809-1877), naval officer. He entered the navy in 1832, having previously studied law; took part in the Mexican War, and on the outbreak of the Civil War joined the Confederate service, and gained much prominence from his feats in command of the *Sum-*

*ter* and the *Alabama*. He was imprisoned after the war, but gained his liberty at the amnesty. The rest of his life was devoted to law practice. He was the author of *Service Afloat and Ashore*, *Cruise of the Alabama and Sumter*, etc.

**Semoli'na**, a term applied to a kind of wheat meal in large, hard grains, used for making puddings, thickening soup, etc. In grinding the millstones are so adjusted as to leave the product in a granular form and not reduced to a state of flour. The hard wheats of Southern Europe are best adapted for this purpose.

**Sempach** (zem'páh), a village of Switzerland in the canton of 8 mi. n.w. of Lucerne, on the Lake of Sempach. It is remarkable as being the scene of a great victory which the Swiss gained over the Austrians under Duke Leopold, who was slain, together with 600 nobles and upward of 2,000 troops. Pop. 1,183.

**Senate**, originally the supreme legislative body of ancient Rome, first instituted according to tradition by Romulus. Tarquinius Priscus is said to have increased the number of members from 100 to 300, thus making 100 representatives for each of the Patrician tribes. Under the republic the consuls, consular tribunes, and later the censors, had the power of choosing the senators; but they were restricted to those who had previously held magistracies, and as the magistrates were chosen by popular election the senate was ultimately a representative body. In the administration of affairs the senate was supreme, and during national crises could invest the consuls with absolute and dictatorial authority. A decree of the senate was called *senatus consultum*. The number of senators necessary to form a quorum during the republic is uncertain. After this body had remained for several centuries at 300, their number was raised by Sulla to 600, he having added 300 equites to the senate. Julius Cæsar made a further increase of 300, and at one time there were 1,000, but Augustus lowered their number to 600, and required the presence of 400 to constitute a full assembly. He afterward further reduced them, and later 70 members were considered sufficient. The majority of votes always decided a question. In modern times the term is applied to the upper or less numerous branch of a legislature in various countries, as in the U. S., France, in most of the separate states of the Union, and in some of the Swiss cantons. It is also used to designate the governing body of certain universities. See *United States*.

**Sen'eca**, a lake in the western part of New York state, 25 mi. s. of Lake Ontario, into which its waters flow. It is about 37 mi. long, from 2 to 4 mi. broad, and 630 ft. deep. It communicates with the Erie Canal, and steamers ply upon it.

**Sen'eca**, LUCIUS ANNÆUS (3-66), called Seneca the philosopher, was b. at Corduba (Cordova). When quite young he went to Rome, where he made rapid advances in knowledge under the tuition of his father, and also studiously pursued the Stoic philosophy. One of



## Seneca

his best treatises, *Consolatio ad Helviam* (a letter of consolation addressed to his mother), and also *Consolatio ad Polybium* (a letter consoling Polybius on the loss of his brother), were written in Corsica, whither he was banished in A. D. 41, being accused, through the jealousy of Messalina, of undue intimacy with Julia, a niece of the Emperor Claudius. He was recalled in 49, made praetor, and appointed joint tutor with Burrhus of the young Domitian, afterward the Emperor Nero. The good government of the first years of Nero's reign was largely due to Seneca (though Seneca had consented to the assassination of Nero's mother), but he lost his influence, and being accused of complicity in the conspiracy of Piso he was forced to commit suicide. His works comprise treatises on *Anger*; on *Providence*; on *Tranquillity of Mind*; on the *Steadfastness of the Wise Man*; on *Clemency*, addressed to Nero; seven books on *Benefits*; seven on investigations of nature; and twenty books of moral letters. The tragedies which bear Seneca's name are very inferior to his prose writings, and it is doubtful whether he is really the author, some of them having been attributed to his father.

**Seneca**, MARCUS ANNÆUS, rhetorician, and the father of the preceding, was a native of Corduba, in Spain, and was b. about 61 B.C. He went to Rome during the reign of Augustus, and there taught rhetoric with great success for several years. He died at Rome toward the close of the reign of Tiberius (A.D. 37). He was the author of a collection of extracts showing the treatment of school themes by contemporary rhetoricians, but of no importance as literature.

**Seneca Falls**, Seneca co., N. Y., on Seneca River. Railroad, N. Y. C. & H. R. The factories, furnished with good water power, turn out pumps, fire engines, knit goods, fash and blinds, etc. Pop. 1900, 6,518.

**Seneca Indians**, a tribe originally inhabiting the western part of New York state, and belonging to the Six Nations. They number upward of 2,600 on New York reservations, and a small band are in the Indian Territory.

**Sen'efelder**, ALOYS (1771-1834), the inventor of lithography, b. at Prague, d. at Munich. See *Lithography*.

**Sen'ega** (or Sen'eka), a plant common in the U. S. It has a woody, branched, contorted, root, about  $\frac{1}{2}$  in. in diameter, and covered with ash-colored bark. This has been celebrated as a cure for the bite of the rattlesnake. Medically it is considered stimulating, expectorant, and diuretic, and is now almost exclusively used in cough mixtures, being similar in its effects to squill.

**Sen'egal**, a river of Western Africa, which rises in the interior not far from some of the Niger sources, and after a course of some 1,000 mi. falls into the Atlantic near lat. 16° north. It is navigable for about 700 mi. from its mouth, as far as the cataracts of Félou, beyond which its capabilities have not been ascertained. Its volume approaching the coast is greatly reduced by numerous *marigots* or

## Sennacherib

channels which divert its waters through the adjacent plains, and as its mouth is dangerously barred, at most seasons the entrance of any but small craft is prevented.

**Senegal**, a French colonial dependency in West Africa, in Senegambia, comprising the island and town of St. Louis, at the mouth of the Senegal, several forts along the banks of that river, the island of Goree, Albuda on the Gambia, and other stations south of Cape Verd. Area (including dependencies) 140,000 sq. mi. The chief exports are groundnuts, palm oil, kola nuts, gum, hides, wax, ivory, cabinet woods, and gold dust. Imports, manufactured goods, wines, spirits, and provisions. The French first settled here in 1637. It was taken by the English in 1756, retaken by the French in 1779, and subsequently held by the English till the Peace of 1814. Pop. 300,000.

**Senegam'bia**, an extensive region of Western Africa, bounded n. by the Sahara, e. by Soudan, s. by Guinea, and w. by the Atlantic. The western or maritime portion of the country is a low, flat, swampy plain from 150 to 200 mi. wide. East portion of the country is mountainous with valleys running north and south. The chief rivers are the Senegal, the Gambia, the Rio Grande, and the Nuñez. Vegetation is luxuriant along the lower Senegal. Further south the mangrove and palm, together with the gigantic baobab, the African teak, and other large trees are seen. Rice, maize, and other grains, with bananas, manioc, and yams are grown, while the orange, citron, and other fruits introduced by the Portuguese are now extensively cultivated on the hills. Wild animals comprise the elephant, hippopotamus, monkeys, antelopes, gazelles, lion, panther, leopard, hyenas, jackal, crocodile, etc. The climate is intensely hot, and very unhealthy for Europeans. The region is divided into French Senegambia (Senegal and protectorate); British Senegambia (Sierra Leone, Gambia, etc.); Portuguese Senegambia (Bissao, Casamanza, etc.); and the native states not under European protection. The population of Senegambia is estimated at 12,000,000, and its area at from 400,000 to 700,000 sq. mi.

**Sennaar'** (or Senaar'), a region of Africa, in the Soudan, area about 115,000 sq. mi., between the Bahr-el-Azrek, or Blue Nile, and the Bahr-el-Abiad, or White Nile. The country is mostly flat and sterile, but well cultivated on the river banks, where are numerous towns or villages. Originally an independent Negro kingdom, it was afterward subject to Egypt; but Khartoum, the Egyptian headquarters, and the whole country were abandoned consequent upon the Soudanese rebellion. Pop. 1,500,000. The town of Sennaar, on the Blue Nile, with about 6,000 inhabitants, has a fairly extensive trade.

**Sennach'erib**, an Assyrian king, son of Sargon, whom he succeeded B. C. 705. He suppressed the revolt of Babylonia, and marched against the Aramaean tribes on the Tigris and Euphrates, of whom he took 200,000 captive. He then reduced part of Media; rendered tributary Tyre, Aradus, and other Phœnician cities;

advanced upon Philistia and Egypt, and finally proceeded against Hezekiah, king of Judah, who had revolted. Yielding to panic Hezekiah paid the tribute exacted of 300 talents of silver and 30 talents of gold. On his return to Assyria Sennacherib again attacked Babylonia and afterward reinvaded Judah. Having marched through Palestine he besieged Libnah and Lachish, and wrote a threatening letter to Hezekiah; but in consequence of a miraculous visitation, which caused the death of 185,000 of his troops, Sennacherib returned to Nineveh and troubled Judah no more. The greatest architectural work of Sennacherib was the palace of Koyunjik, which covered fully 8 acres.

**Sensation**, the name applied to indicate the consciousness of an impression produced on sensory nerve fibers. The external organs by means of which particular kinds of impressions are primarily received, and thence transmitted to the brain, are called the organs of the senses; these are the eye, the ear, the nose, and the tongue, besides the nerves dispersed under the common integument, which gives rise to the common sensation, feeling or touch. This last is of a more general kind than the others, making us aware of heat and cold, rough and smooth, hard and soft, etc. In addition to these, according to Professor Bain, "the feelings connected with the movements of the body, or the action of the muscles, have come to be recognized as a distinct class, differing materially from the sensations of the five senses. They have been regarded by some metaphysicians as proceeding from a sense apart, a sixth or muscular sense." Of the sensations which are most readily perceived by animals that of *resistance* or *touch* is perhaps the most widely diffused. By the resisting feeling of matter we judge of its shape and of its other attributes. Next to resistance sensibility to *heat* is the best defined and most frequently displayed sensation. The sense or consciousness of *light* or luminosity succeeds that of temperature; *taste* comes next in order; then *hearing*; while *smell* is probably one of the least diffused of sensations.

**Sensitive Flames**, gas flames which are easily affected by sounds, being by them made to lengthen out or contract, or change their form in various ways. The most sensitive flame is produced in burning gas issuing under considerable pressure from a small taper jet. Such a flame will be affected by very small noises, as the ticking of a watch held near it, or the chinking of small coins one hundred feet off. The gas must be turned on so that the flame shall be just at the point of roaring.

**Sensitive Plant**, a plant celebrated for its apparent sensibility. It is a native of tropical America, but is often grown in greenhouses. At the approach of night the leaflets all fold together; and the common footstalk bends toward the stem; at sunrise the leaves gradually unfold, and recover their usual state. So far, this is evidently the effect of light, but the same phenomena take place on touching

the plant roughly, only that it recovers itself in a short period.

**Sentinel Crab**, a species of crab so named from its active, watchful habits, and from the very elongated footstalks upon which the eyes are set. It inhabits the shores and islands of the Indian Ocean.

**Se'pia**, a genus of cuttlefishes. These cephalopods, of which the common sepia is a typical example, belong to the "two-gilled" section of their class, and to the group of decapoda or "ten-armed" forms. The family Sepiadae possesses an internal calcareous shell, the so-called *sepistaire* or "cuttlefish bone," which is often cast up upon some coasts, and was formerly in repute as an antacid in medicine; and as the source of the "pounce" once used for spreading over eroded ink marks to form a smooth surface for the corrected writing. The two tentacles or arms, which are longer than the remaining eight, possess suckers at their expanded extremities only. The eggs of the sepia resemble bunches of grapes in form, and hence are sometimes called "sea grapes." The eggs are each protected in a leathery capsule. The common sepia occurs on the southern English coasts, but more especially in the Mediterranean Sea. It is chiefly sought after on account of the inky matter which it affords. This secretion, which is insoluble in water, but extremely diffusible through it, is agitated in water to wash it, and then allowed slowly to subside, after which the water is poured off, and the black sediment is formed into cakes or sticks. When prepared with caustic lye it forms a beautiful brown color, with a fine grain, and has given name to a species of monochrome drawing now extensively cultivated.

**Se'poys** (corrupted form of *sipahis*, soldiers, from *sip*, bow or arrow, the original weapon of the Hindu soldier), the name given to the native forces in India. They now form 9 batteries of artillery, 48 regiments and corps of cavalry, and 127 battalions of infantry, numbering in all 140,610 officers and men. Though not generally equal in courage and dexterity to European soldiers, the Sepoys are hardy and capable of enduring much, and very temperate in their food.

**Sequestration**, in law, the act of separating a thing in controversy from the possession of both parties, till the right is determined by course of law. It is either voluntary or necessary: voluntary when it is done by consent of the parties, and necessary when it takes place by order of the official authority.

**Se'quin**, a Venetian gold coin first struck about the end of the thirteenth century, and equivalent in value to about \$2.30. Coins of the same name, but differing in value, were issued by other states.

**Sequo'ia** (from the American Indian *Sequoyah*, who invented the Cherokee alphabet), a genus of conifers, otherwise called *Wellingtonia* or *Washingtonia*, consisting of two species only—the red-wood of the timber trade, and the *Wellingtonia*, the mammoth tree of the

## Seraglio



Sequoia Giants; The Three Graces.

been successfully introduced into England, where some of them have already attained a good height. Some of these trees indicate an age of over 2,000 years.

**Seraglio** (se-ral'yō) (properly serai), the palace of the Turkish sultan at Constantinople. It stands in a beautiful situation, on a point of land projecting into the sea. Its walls embrace a circuit of about 9 mi., including several mosques, spacious gardens, the harem, and buildings capable of accommodating 20,000 men, though the number of the sultan's household does not amount to above 10,000.

**Seraing** (sé-ran), a town of Belgium, in the province of Liège, 3 mi. s. w. of Liège, on the Meuse. Cockerill's extensive iron, steel, and machine works (including also coal pits), employing 12,000 hands, are established here, and other industries are carried on. Pop. 34,541.

**Serampore** (or Serampur'), a town of Hindustan, in the province of Bengal, on the right bank of the Hoogli, 12 mi. above Calcutta. Serampore was the headquarters of the celebrated Baptist missionaries Carey, Marshman, and Ward; and there are a church, school, college, and library connected with the mission. Pop. 25,559.

**Sera'pis** (or Sara'pis), an Egyptian deity whose worship was introduced into Egypt in the reign of Ptolemy I. Plutarch and Tacitus relate that Ptolemy having seen in a dream the image of a god, which he was ordered to remove from the place in which it stood, sent to Sinope, and brought thence a colossal statue, which he set up in Alexandria. It was declared to represent the god Serapis, and appears to have been originally a statue of Pluto or Jupiter. The name Serapis is composed of the names Osiris and Apis. A magnificent

West. They are both natives of Western America, the latter having been discovered in the Sierra Nevada in 1852. One specimen in Calaveras co., Cal. has a height of 325 ft., and a girth 6 ft. from the ground of 45 ft. The Mariposa Grove, 16 mi. south of the Yosemite Valley, contains upward of 100 trees over 40 ft. in circumference, and one over 93 ft. at the ground, and 64 ft. at 11 ft. higher. This grove is government property. This tree has

## Sergipe

temple was built at Alexandria for the reception of the statue of Serapis, and this temple—the Serapeum—was the last hold of the pagans in that city after the introduction of Christianity. The ruins of another temple to Serapis at Memphis were discovered in recent times. The Egyptians themselves never acknowledged him in their pantheon; but he was the principal deity in the Greek and Roman towns of Egypt. Forty-two temples are said to have been erected to him in Egypt under the Ptolemies and Romans; his worship extended also to Asia Minor, and in 146 A. D. it was introduced to Rome by Antoninus Pius. The image of Serapis perished with his temple at Alexandria, which was destroyed in 389 by the order of Theodosius.

**Seres**, a walled town in Turkey, 35 mi. n. e. of Salonica. It is well built, and has various mosques and Greek churches, spacious bazars, manufactures of linen and cotton goods, and a considerable trade in cotton, tobacco, corn, and fruit. Pop. about 30,000.

**Sereth** (se-ret'), an important affluent of the Danube. It rises in the Carpathians in Bukovina, flows through Roumania, and joins the Danube 5 mi. above Galatz after a course of 300 mi.

**Serfs**, a term applied to a class of laborers existing under the feudal system, and whose condition, though not exactly that of slaves, was little removed from it. Under this system, from the vassals of the king downward, the whole community was subject to certain degrees of servitude, and it was only on condition of specific services to be rendered to his superior that any individual held his fief. In the case of the lower classes this servitude amounted to an almost complete surrender of their personal liberty. There were two classes of laborers, the villeins and the serfs proper. The former occupied a middle position between the serfs and the freemen. A serf could not be sold, but could be transferred along with the property to which he was attached. The revival of the custom of manumission counteracted the rapid increase of serfs. A serf could also obtain his freedom by purchase, or by residing for a year and a day in a borough, or by military service. By these various means the serf population gradually decreased. In most parts of the Continent they had disappeared by the fifteenth century. The extinction of serfdom in England and Scotland was very gradual. As late as 1574 Elizabeth issued a commission of inquiry into the lands and goods of her bondsmen and bondswomen in specified counties in order to compound for their manumission; and even in the eighteenth century a species of serfdom existed among Scottish miners. Serfdom in Russia was abolished by a manifesto of Alexander II on March 17, 1861.

**Sergeant-at-Arms**.—The U. S. sergeant-at-arms of the national House of Representatives or Senate, or of a state legislative body, is the officer charged with the preservation of order, and, frequently, with accounts, disbursements, and the serving of process.

**Sergipe** (ser-zhō'pe) (or Sergipe-del-rey), a



## Seriema

maritime province of Brazil, north of Bahia; area 12,034 sq. mi. The coast is low and sandy, but the interior is mountainous. The chief river is the São-Francisco on the north. Cotton, sugar cane, rice, tobacco, etc., are grown, and the woods furnish good timber, dyewoods, and quinine. Pop. 311,170.

**Serie' ma**, a grallatorial bird of the size of a heron inhabiting the open, grassy plains of Brazil and other parts of South America. Its feathers are of a gray color, and a kind of crest rises from the root of the beak, consisting of two rows of fine feathers curving backward. The eye is sulphur-yellow, the beak and feet red. It is of retired habits, and utters a loud, screeching cry, which somewhat resembles that of a bird of prey or the yelping of a young dog. The seriema is protected in Brazil on account of its serpent-killing habits, and is often domesticated.

**Seringapatam'** (properly, *Sri-ranga-patnam*, "City of Vishnu"), a celebrated town and fortress in the province of Mysore, Madras presidency, India. It is situated on an island formed by two branches of the Kaveri, 245 mi. s.w. of Madras, and is generally ill-built, with narrow, dirty streets. It was once the capital of Mysore. The palace, formerly extensive, is now in ruins. The massive fortifications were the work of Tippo, the son of Hyder Ali, assisted by French engineers, and the fortress was three times besieged by the British, first in 1791, and afterward in 1792 and 1799. On the last occasion it was carried by assault, Tippo himself being slain while fighting desperately, together with 8,000 men. Pop. 10,594, once 140,000.

**Seri' phos** (or Serpho), a small rocky island belonging to the Greek Cyclades, yielding some corn and wine, while iron ore is mined. It was used as a place of exile by the Romans. Pop. 2,943.

**Serous Membranes** are certain double membranes in the human body, as the pleura, pericardium, peritoneum, etc., which form a sort of closed sac surrounding certain organs, the interior surfaces of the sac secreting a small quantity of serous fluid. Their chief function is to allow free action to the organs, and they are also intimately connected with the absorbent system, the vessels of which freely open on their surfaces. These membranes are liable to various diseases, as inflammation (pleurisy, pericarditis, etc.), morbid growths, dropsical effusions, hemorrhage, etc.

**Serpent Charming**, an art of great antiquity, confined in practise exclusively to certain countries. The power exercised by the charmers over poisonous serpents is unquestionably remarkable, and though there is little doubt that the common practise of the charmer is to extract the fangs before exhibiting their feats, yet we have good authority for believing that it is not unusual to dispense with this. The instrument usually employed in serpent charming is a kind of pipe, which is varied by whistling and the use of the voice. The effect of this medley of sounds is to entice the serpents from their holes, and this done the serpent

## Serpents

charmer pins them to the ground with a forked stick. In India and other places the art of serpent charming is an hereditary profession, and is practised for the purpose of gaining a livelihood by administering to the amusement of the public. Besides the evident power music has upon the serpents, they appear to be influenced in a marked degree by the eye of the charmer, who controls them by merely fixing his gaze upon them.

**Serpentine**, an abundant mineral, usually having a granular or impalpable composition, and presenting red, brown, black, yellow, and gray colors, in veined, spotted, and other figures or combinations; surface almost dull; luster resinous; streak white, acquires some luster; hardness 3; specific gravity 2.5. Serpentine is divided into the *common* and *precious* serpentine, the former of which consists of those varieties which are destitute of handsome colors, while the latter includes all such as are suited to purposes of ornament. Chemically it is a hydrous silicate of magnesia. Serpentine forms mountain masses, and beds in primitive rocks. Ornamental varieties of it are turned on the lathe into vases, and also worked into different ornaments.

**Serpents** (or Snakes), an order of reptiles, characterized by an elongated and cylindrical body covered with horny scales, but never with bony plates. There is never any breast



Open mouth of a venomous snake, showing the fangs half hidden in their sheaths.

bone nor pectoral arch, nor fore limbs, nor as a rule any traces of hind limbs. In a few cases, however (as in the python), rudimentary hind limbs may be detected. The ribs are always numerous, some serpents having more than 300 pairs. These not only serve to give form to the body and aid in respiration, but are also organs of locomotion, the animal moving by means of them and of its scales, which take hold on the surface over which it passes. The vertebræ are formed so as to give great pliancy, most if not all serpents being able to elevate a large portion of their body from the ground. They have hooked, conical teeth, not lodged in distinct sockets, useless for mastication, but serving to hold their prey. In the typical non-poisonous or innocuous serpents, both jaws and the palate bear continuous rows of solid conical teeth. In the venomous serpents, as vipers, rattlesnakes, etc., there are no teeth in the upper jaw excepting the two poison fangs. These are long, firmly fixed in a movable bone, above which there is a gland for the elaboration of poison. Each tooth is perforated by a tube through which the poison

## Serpula

is forced. The tongue, which is forked, can be protruded and retracted at pleasure, and is probably rather an organ of touch than of taste. The eye is unprotected by eyelids, but it is completely covered and protected by an anterior layer of transparent skin attached above and below to a ridge of scales which surrounds the eye. No external ear exists. The nostrils are situated on the snout. The heart has three chambers, two auricles and a ventricle. The digestive system comprises large salivary glands, a distensible gullet, stomach, and intestine, which terminates in a cloaca with transverse external opening. A urinary bladder is absent. The lungs and other paired or symmetrical organs of the body generally exhibit an abortive or rudimentary condition of one of these structures. As regards reproduction they are either oviparous or ovoviviparous, the eggs being hatched externally or within the animal's body. Many serpents, especially the larger species, as the boas, subsist on prey thicker than themselves, which they crush by constriction, and which they are able to swallow from the throat and body being capable of great dilatation.

**Serpula**, a genus of worms belonging to the order of tube-dwelling worms, inhabiting cylindrical and tortuous calcareous tubes attached to rocks, shells, etc., in the sea. The worm fixes itself within its tube by means of the bristles attached to its body segment. Its head segments are provided with plume-like gills or branchiae. No eyes exist in this creature, although it is extremely sensitive to the action of light.



*Serpula contortuplicata* (with expanded gills), on the back of an oyster shell.

**Serra da Estrella**, a lofty range of granite mountains near the middle of Portugal, highest summit 6,460 ft. The range contains some remarkable lakes, part of which are tepid.

**Serto'rius**, QUINTUS (120-72 B.C.), a Roman general. After serving with reputation under Marius against the Teutones in Spain he was made quaestor in Cisalpine Gaul in 91 B. C. In the quarrel between Sulla and Marius he sided with the latter. When Sulla returned from the Mithridatic War (83 B.C.) Sertorius was proscribed and fled to Spain. There he attempted to organize a force capable of resisting the army sent by Sulla to conquer Spain, but finding his means unequal to the contest he crossed over to Africa. He now assisted the Maurita-

## Servetus

ans fighting against their king. Having gained several victories and liberated the Mauritians, the Lusitanians requested him to return to Spain and take command of their troops against the Romans. Opposed to much superior forces he displayed the talents of a skillful general, and successfully resisted the Roman leaders Metullus and Pompey. He was treacherously assassinated at a feast by his friend Perperna. Sertorius has been made the subject of a tragedy by Corneille.

**Serval** (or Bush-cat), a carnivorous animal nearly related to the leopard and its allies, &



Serval.

native of Africa. Its general body-color is a bright yellow or golden luster, with a grayish tint, and marked with black spots. The average length is about 2 ft. 10 in. including the thick bushy tail, which is from 10 to 12 in. long. This animal is readily domesticated. Its fur is in great request, and obtains high prices. The name of *Tiger-cat* is frequently applied to the serval.

**Servetus**, MICHAEL (properly Miguel Servete) (1509-1553), a learned Spaniard, memorable as a victim of religious intolerance, was b. at Villa Nueva, in Arragon. He was the son of a notary, who sent him to Toulouse for the study of the civil law. Here he began to give his attention to theology, and having formed views of the Trinity antagonistic to the orthodox doctrine he removed to Germany, where he printed a tract entitled *De Trinitatis Erroribus* (1531), followed a year later by his *Dialogorum de Trinitate Libri duo*. Finding that his opinions were obnoxious in Germany, he escaped to France under the name of Michael of Villa Nueva. At Paris Servetus met Calvin for the first time, and an arrangement was made for a theological discussion between them; but Servetus failed to appear. In Vienna, in 1553, he published his matured theological system under the title of *Christianismi Restitutio* (*Restoration of Christianity*). He was arrested for heresy and imprisoned, but contrived to escape, and purposed to proceed to Naples. He was, however, apprehended at Geneva on a charge of blasphemy and heresy, and his various writings were sifted in order to insure his condemnation. The divines of all the Protestant Swiss cantons unanimously declared for his punishment, and Calvin was especially urgent and emphatic as to the necessity of putting him to death. As he refused to retract his opinions he was burnt at the stake. Servetus is numbered among

## Servia

the anatomists who made the nearest approach to the doctrine of the circulation of the blood.

**Servia** (Slavonic, *Serbia*; Turkish, *Syryp*), an independent kingdom of Eastern Europe, bounded n. by Austria-Hungary, from which it is separated by the Save and the Danube; e. by Roumania and Bulgaria; s. by Turkey; and w. by Bosnia; area 19,051 sq. mi.; pop. 1901, 2,535,066. The surface is elevated and is traversed by ramifications of the Carpathians in the northeast, of the Balkans in the southeast, and of the Dinaric Alps in the west. The summits seldom exceed 3,000 ft., though the highest reaches 6,325. The whole surface belongs to the basin of the Danube, which receives the drainage partly directly, and partly by the frontier rivers Save, augmented by the Drin and the Timok, but chiefly by the Morava, which flows through the center of the kingdom. The climate is somewhat rigorous in the elevated districts, but mild in the valleys and plains. There are extensive forests and uncultivated wastes, the forest area being 42 per cent. of the total area. The chief agricultural products are maize, wheat, flax, hemp, and tobacco. Wine is grown in the districts adjoining Hungary, and the cultivation of prunes is extensive. Lead, zinc, quicksilver, copper, iron, and coal are found. Manufactures include carpet weaving, embroidery, jewelry, and filigree work. The principal exports are dried prunes, pigs, wool, wheat, wine, hides, cattle, and horses; imports, cotton, sugar, colonial goods, hardware, etc. The bulk of the trade is with Austria. The total exports in 1888 amounted to \$6,600,000; imports to \$7,770,000. There are 340 mi. of railway and 1,800 mi. of telegraph. The great majority of the inhabitants are Slavonians, and adhere to the Greek Church. The Servian language, formerly often called the *Illyrian*, is a melodious Slavonic dialect closely allied to the Bulgarian and Slavic, and forms with them the southern Slavonic group. Several collections of patriotic Servian songs have been published, and both Goethe and Grimm have acknowledged the excellence of Servian poetry. In prose literature, however, little has been produced besides theological and religious works. The present constitution of Servia dates from 1889. The government is a hereditary monarchy, and the people are represented by an elected legislative assembly called the *skupstchina*. The principal source of revenue is a capitation tax. The revenue in 1888, \$7,200,000, and the expenditure, \$9,200,000; public debt about \$60,000,000. The standing army numbers about 18,000 men, with a reserve of 155,000 men. Servia is divided into fifteen (formerly twenty-two) administrative districts, of which Belgrade (the capital) forms one by itself. Other principal towns are Nisch, Leskovatz, and Pozarevatz.

**History.**—Servia was anciently inhabited by Thracian tribes; subsequently it formed part of the Roman province of Moesia. It was afterward occupied in succession by Huns, Ostrogoths, Lombards, Avars, and other tribes. The Servians entered it in the seventh century,

## Service Tree

and were converted to Christianity in the next century. They acknowledged the supremacy of the Byzantine emperors, but latterly made themselves independent, and under Stephen Dushan (1336-56) the kingdom of Servia included all Macedonia, Albania, Thessaly, Northern Greece, and Bulgaria. About 1374 a new dynasty ascended the throne in the person of Lazar I, who was captured by the Turks at the battle of Kossova (in Albania) in 1389, and put to death. Servia now became tributary to Turkey. About the middle of the fifteenth century it became a Turkish province, and so remained for nearly 200 years. By the Peace of Passarowitz in 1718 Austria received the greater part of Servia, with the capital, Belgrade. But by the Peace of Belgrade in 1739 this territory was transferred to Turkey. The barbarity of the Turks led to several insurrections. Early in the present century Czerny George placed himself at the head of the malcontents, and, aided by Russia, succeeded after eight years of fighting in securing the independence of his country by the Peace of Bucharest, May 28, 1812. The war was renewed in 1813, and the Turks prevailed. In 1815 all Servia rose in arms under Milosh, and after a successful war obtained complete self government, Milosh being elected hereditary prince of the land. Milosh was compelled to abdicate in 1839 and was nominally succeeded by his son Milan, who died immediately, leaving the throne vacant to his brother Michael. In 1842 this prince was compelled to follow the example of his father and quit the country, Alexander Kara-Georgevitch, son of Czerny George, was elected in his room; but in December, 1858, he also was forced to abdicate. Milosh was then recalled, but survived his restoration little more than a year. His son Michael succeeded him (1860), but was assassinated by the partisans of Prince Alexander on July 10, 1868. The princely dignity was then conferred on Milan (Obrenovitch), grand-nephew of Milosh. After the fall of Plevna in the Russo-Turkish War of 1877-78 Servia took up arms against Turkey, and by the Treaty of Berlin (July 13, 1878) it obtained an accession of territory and the full recognition of its independence. It was erected into a kingdom in 1882. In 1885 a short war took place between Servia and Bulgaria, resulting in favor of the latter. In 1889 Milan abdicated in favor of his son Prince Alexander, b. Aug. 14, 1876, who has since been the ruler of the country as Alexander I. Milan died Feb. 11, 1901.

**Service tree**, a European tree from 50 to 60 ft. high, of the same genus as the apple and pear. It has imparipinnate leaves, whitish beneath; flowers in clusters, cream colored, and resembling those of the hawthorne; fruit a reddish-colored berry (about the size of a small gooseberry), which, like the medlar, is only pleasant in an overripe condition. The wood is very hard, compact, solid, fine-grained, and susceptible of a brilliant polish. It is in great request among turners and cabinet-makers. One species, the mountain ash, is a small tree found in mountain woods in



## Servius Tullius

New England and middle states.

**Servius Tullius**, the sixth king of Rome. According to the tradition he was the son of a slave, given by the elder Tarquin to Tanaquil, his wife. He married Tarquin's daughter, and on the death of his father-in-law (578 B.C. according to the usual chronology) he was raised to the throne. He defeated the Veientes and the Etruscans, and divided the population of Rome into tribes, instituting at the same time the *comitia centuriata* and *tributa*; he also beautified the city, and built several temples. According to the common story Servius married his two daughters to the grandsons of his father-in-law; the elder to Tarquin, and the younger to Aruns. The wife of Aruns murdered her own husband to unite herself to Tarquin, who had assassinated his wife. Servius was murdered by Tarquin, and his own daughter Tullia ordered her chariot to be driven over the mangled body of her father (534 B.C.).



Service Tree. a.—fruit, showing section.

**Ses'amum** (or Ses'ame) (*Sesamum*), a genus of annual herbaceous plants. The species, though now cultivated in many countries, are natives of India. *Sesamum orientale* and *S. indicum* are cultivated, especially in India, Egypt, and Syria; they have also been introduced in America. Sesamum seeds are sometimes added to broths, frequently to cakes by the Jews, and likewise in the East. The oil expressed from them is bland and of a fine quality, and will keep many years without becoming rancid. It is often used as a salad oil, and is also known as *gingelly oil* and *benné oil*. The leaves of the plant are mucilaginous, and are employed for poultices. Of the seeds, two varieties are known in commerce, the one white and the other black.

**Setter**, a breed of dogs, so named from their habit of crouching or "setting" on observing the game which they are trained to hunt. The distinct races are the English, Irish, and Russian setters. The two former have a narrower muzzle than the pointer, with the lower angle more rounded; the eye quick; the ears long, thin, and covered with wavy, silken hair; the tail with a fan-like "brush" of long hair, and slightly curled at its tip; the hind legs and feet fringed. The Russian setter has thick woolly fur, the muzzle bearded, the soles of the feet hairy, and possesses a very keen scent. Crossed with the English it produces an admirably sharp variety.

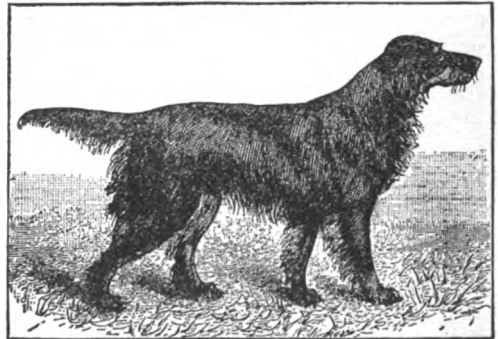
**Settlement**, in law: 1, a deed by which property is settled; especially the general will

## Seven Wonders of the World

or disposition by which a person regulates the disposal of his property, usually through the medium of trustees, and for the benefit of a wife, children, or other relatives; or the disposition of property at marriage in favor of a wife; 2, legal residence or establishment of a person in a particular parish, town, or locality, which entitles him to maintenance if a pauper, and subjects the parish or town to his support. The *prima facie* settlement of a pauper is the place of his birth, and this remains his settlement until he has acquired another settlement. In the U. S. a settlement may be acquired in various ways, to wit, by birth; by the legal settlement of the father, in the case of minor children; by marriage; by continued residence; by the payment of requisite taxes; by the lawful exercise of a public office; by hiring and service for a specified time; by serving an apprenticeship; and perhaps some others, which depend upon the local statutes of the different states.

**Seven Sleepers**, a famous story of seven Christian youths of Ephesus imprisoned by order of the emperor Decius in a neighboring cave in which they had sought refuge, and where they fell asleep for nearly two hundred years, awakening in the reign of Theodosius II to find, of course, a new civilization. They then related their story to the multitude, gave them their benediction, and expired. The church has consecrated June 27 to their memory. The Mohammedans have a similar legend. The basis of the Christian story is said to have been the fact that the dead bodies of seven youths so imprisoned were found in a cave, and the habit which Christian writers had of describing death as falling asleep in the Lord doubtless contributed to the miraculous character of the story.

**Seven Wise Men** (or Seven Sages of Greece). As generally set down they were Periander of Corinth, Pittacus of Mitylene, Thales of Miletus, Solon of Athens, Bias of Priēnē, Chilo of Sparta, and Cleobulus of Lindus. Maxims of prudence and elementary morality are re-



Setter Dog.

garded as embodying a summary of their wisdom. Among these maxims are, "Know thyself," "Nothing in excess," "Consider the end," etc.

**Seven Wonders of the World**, an old desig-

nation of seven monuments, remarkable for their splendor or magnitude, generally said to have been: the pyramids of Egypt, the walls and hanging gardens of Babylon, the temple of Diana at Ephesus, the statue of the Olympian Jupiter at Athens, the Mausoleum at Halicarnassus, the Colossus of Rhodes, and the Pharos or lighthouse of Alexandria.

**Seven Years' War**, a famous European war which lasted from 1756 to 1763. As the result of a war with Prussia Maria Theresa of Austria had to cede Silesia to Frederick the Great. With a view to recover her lost territory she concluded an alliance with Russia, secured the support of Poland and Saxony, and attempted to form a closer union with France. In the meantime war broke out between France and England (1755), and George II, in order to protect his German states, concluded an alliance with Prussia, while France agreed to aid Austria against Frederick. Being informed of these negotiations Frederick resolved to anticipate his enemies. In August, 1756, he invaded Saxony, occupied the chief towns, and compelled the Saxon army to surrender. This step created a stir in the European courts, and in 1757 Austria, Russia, France, Sweden, and the German Empire were in arms against Frederick, while he had no ally but England and a few German states. In 1757 Frederick marched into Bohemia and gained a bloody battle at Prague (May 6). Soon after, however, the Austrians under Daun defeated Frederick at Kollin (June 18), relieved Prague, and forced the Prussians to retreat to Saxony and Lusatia. The French army, after defeating Frederick's German allies (under the Duke of Cumberland) at Hastenbeck, united with the imperial forces; Frederick met them at Rossbach and routed both armies on November 5. He then hurried back to Silesia, which was occupied by the Austrians, and vanquished a superior army under Daun at Leuthen (December 5), thus recovering Silesia. While Frederick was thus occupied in the south and west, his general Lehwald had successfully repelled the Swedes and Russians on the north and east. The next campaign was opened in February, 1758, by Ferdinand, duke of Brunswick, who, at the head of Frederick's allies, opposed the French in Lower Saxony and Westphalia. He defeated the French at Krefeld in June, and ultimately drove the enemy behind the Rhine. Frederick, driven out of Moravia, defeated the Russians, who had advanced to Zorndorf, in Brandenburg, was defeated in turn by Daun at Hofkirchen, but before the end of the year drove the Austrians from Silesia and Saxony. Louis XV and his mistress, the Marchioness de Pompadour, were bent on continuing the war, and concluded a new alliance with Austria, Dec. 30, 1758. Frederick, however, had also obtained a new treaty with Britain, which promised him a large yearly subsidy.

The new campaign was opened in March, 1759, Prince Henry, Frederick's brother, marching into Bohemia, where he dispersed the hostile forces, and captured immense

quantities of military stores. The Russians, having defeated the Prussian general Wedel near Zulichau (July 23), advanced to Frankfurt-on-the-Oder. Frederick hastened to meet them in person, and had already defeated them at Kunersdorf (August 12) when his victory was snatched from him by the Austrians under Laudon, who inflicted on him a defeat such as he had never sustained before. Frederick's position was now extremely precarious. The Russians were victorious in his hereditary states, Daun was in Lusatia with a large army, and Saxony was overrun by the imperial troops. In the west Frederick's allies had been more successful. On August 1, Ferdinand gained a splendid victory at Minden over the French troops under Contades and Broglie. On the same day his nephew defeated the French at Gohfeld, and they were driven over the Lahn on one side and over the Rhine on the other. The Swedes also, who, after the battle of Kunersdorf invaded Prussian Pomerania, were driven by Manteuffel and Platen under the cannon of Stralsund. The campaign of 1760 seemed at first to forebode ill success to Frederick. While he himself was engaged in Saxony Fouqué suffered a defeat in Silesia, in consequence of which the Austrians occupied the whole country. Frederick thereupon gave up Saxony in order to recover Silesia. On August 15 he defeated Laudon at Liegnitz, by which he effected his purpose of recovering Silesia. He then returned to Saxony and attacked the imperial forces at Torgau, on the Elbe (November 3), defeated them in a bloody engagement, and went into winter quarters in Saxony. The Russians also were forced to Poland, and Ferdinand defeated the French at Marburg (July 31). In the campaign of 1761 the operations of Ferdinand of Brunswick and the French on the Rhine consisted of alternate advances and retreats, and the Russians and Austrians were so enfeebled that they failed to make any impression on Frederick's remnant of an army. In the campaign of 1762 the French were defeated (June 24) at Wilhelmsthal, and Cassel surrendered to the allies on November 1. Two days after this the preliminaries of peace between Britain and France were signed, and the peace itself was confirmed at Paris, Feb. 10, 1763. After a short negotiation Frederick concluded a peace with Austria and Saxony at Hubertsburg (February 15), by which he retained Silesia. The war in Europe was accompanied by war by sea and land between the French and British abroad, the result of which was to give Britain a decided superiority over France both in America and India.

**Severn**, the second largest river in England, formed by the union of two small streams which rise in Mount Plinlimmon, Montgomeryshire, and after a circuitous southerly course of about 210 mi. falls into the British Channel. It receives the Tern, Upper Avon, and Lower Avon on the left, and the Teme and Wye on the right. Its basin has an area of 8,580 sq. mi. It is navigable to Welshpool, about 178 mi. above its mouth and 225 ft. above sea level.

## Severus

Below Gloucester the banks become so low that destructive inundations have not infrequently occurred.

**Seve'rus**, LUCIUS SEPTIMUS (146-211), a Roman emperor, b. near Leptis, in Africa, of a noble family. He early showed an ambitious mind and great military ability. Under Commodus he commanded the legions in Pannonia, and on the murder of Pertinax in March, 193, was proclaimed emperor by his troops. Severus accordingly marched to Rome to subdue the partisans of Didius Julianus, who had purchased the imperial purple from the praetorians. On his approach Julian was assassinated by his own soldiers. Severus gained many adherents, banished the praetorians, and rid himself of the rivalry of Albinus, commander of the Roman forces in Britain, by conferring upon him the title of Caesar. He then marched to the East against Pescennius Niger, who had also been elected emperor by a powerful army. After many obstinate battles Niger was routed on the plains of Issus (A.D. 194). Having sacked Byzantium and conquered several Eastern nations, Severus returned to Rome. Severus, with his two sons Caracalla and Geta, now marched to the East to repel an invasion of the Parthians, and subjugated Seleucia, Babylon, and Ctesiphon. Leaving Parthia he visited the tomb of Pompey the Great, and entered Alexandria. After subduing an insurrection in Britain, and building a stone wall from the Tyne to the Solway Firth as a defense against the Caledonians, he d. at York.

**Severus**, WALL OF, the name given to the wall or barrier formed at the boundary of the Roman Empire in Britain between the Solway and the Tyne by the Roman emperor Severus about 210 A.D., following the line of a similar structure made in the reign of Hadrian (A.D. 120), and usually called Hadrian's Wall. Remains of it are still to be seen over long ranges of country.

**Seville** (Sevilla) (se-vil'; se-vēl'yā), a city of Spain, in Andalusia, on the left bank of the Guadalquivir, capital of a province of the same name, 62 mi. n.e. of Cadiz. It is largely built in the Moorish style, with narrow, ill-paved streets, the old Moorish houses having spacious interior court yards with a fountain in the middle. The city has a large and handsome Gothic cathedral dating from the fifteenth century; an alcazar or palace in the Moorish style; an exchange called the Casa Lonja; a bull ring, a fine stone building holding 12,000 persons; an aqueduct of 410 arches built by the Moors; a university; a picture gallery, rich in examples of Murillo and Zurbaran; the house of Murillo, with collection of pictures; several interesting churches; an enormous hospital in the Grecian style, built in 1546; etc. On the other side of the river is the suburb of Triana, inhabited by gypsies, bull fighters, etc. The manufactures include silks, cottons, woollens, pottery, machinery, chocolate, leather, and especially tobacco and cigars, there being an immense cigar factory in which some 5,000 females are employed. The river is navigable

## Sewage

for vessels of considerable size up to the city; a good trade is carried on, large quantities of oranges in particular being exported. Seville is one of the most ancient cities of Spain. Julius Caesar gave it the title of *Romula*. It was the residence of the Gothic kings before they moved to Toledo in the sixth century. It surrendered to the Moors early in the eighth century, and remained in their possession till 1248, when Ferdinand III, king of Castile, after a year's siege, forced Seville to open its gates to him. At this time it is said to have contained 600,000 inhabitants; and upon the capitulation 300,000 Moors abandoned the city. After the discovery of America it became the center of the commerce of the New World, and was very flourishing; but the superior advantages of the port of Cadiz induced the government to order the galleons to be stationed at the latter place, after which it began to decline. In 1810 the city surrendered to Soult, who exercised great cruelties and extortion in it, till in 1813 he was forced by the British to evacuate it. In 1843 it was besieged for nine days by Espartero, when it capitulated. Pop. 143,000. The province has an area of 5,300 sq. mi., and the greater part consists of fertile plains, producing all kinds of cereals, seeds, vegetables, oranges and other fruits; wine, oil, tobacco, etc. Large numbers of horses are reared. The chief river is the Guadalquivir. Minerals include iron, silver, lead, and copper. The chief exports are wheat, barley, oranges, oil, wool, copper, etc. Pop. 507,000.

**Sèvre** (sāv'r), the name of two rivers in N.W. France. The Sèvre Nantaise rises in the department Deux-Sèvres, and flows into the Loire opposite Nantes after a course of 86 mi. The Sèvre Niortaise rises 31 mi. more to the southeast, in the same department, and flows into the Atlantic 10 mi. n. of La Rochelle after a course of 89 mi. The department of Deux-Sèvres takes its name from these two rivers.

**Sèvres**, DEUX (deu-sāv'r) ("two Sèvres"), a department in France, bounded by Maine-et-Loire, Vienne, Charente, Charente-Inférieure, and Vendée; area 2,316 sq. mi. Cereals, leguminous crops, and hops are grown. The vine, though extensively cultivated, yields only an inferior wine. The forests are chiefly of hard wood. The minerals include iron, millstones, pavement, and limestone in abundance. The principal manufactures are linen and cotton goods, serge, flannel, woollen hosiery, and gloves. The capital is Niort. Pop. 353,766.

**Sewage** (sū'āj), the matter which passes through the drains, conduits, or sewers, leading away from human habitations singly, or from houses collected into villages, towns, and cities. It is made up of excreted matter, solid and liquid, the water necessary to carry such away, and the waste water of domestic operations, together with the liquid waste products of manufacturing operations, and generally much of the surface drainage water of the area in which the conveying sewers are situated. Until very recent times human excreta was deposited in outhouses or pits, commonly called cesspools. The invention of water



## Sewage

closets necessitated the use of the sewers, and the water carriage of excreta was until lately regarded as the most satisfactory method of disposing of these matters. It was argued that the oxygen of the air held in solution by the water destroyed the organic matter and rendered it innocuous. But experience has shown that a large river only can oxidize the excreta of the towns on its banks, and that whenever these are passed into the rivers at some distance from the sea they are apt to become offensive. Sewage, when fresh and freely exposed to the air, is almost inodorous, but once it accumulates putrefaction sets in, it becomes vilely odorous, and pollutes the atmosphere by the production of poisonous gases. To prevent this it has been suggested that all sewers should have a greater fall than at present, and many attempts have been made to prevent the accumulation of gases in sewers by ventilation. Many methods for the ultimate disposal of sewage have been proposed, but these all may be divided into three great classes, viz., *precipitation*, *irrigation*, and *filtration*, since the throwing of sewage into a body of water in order that it may be carried away by currents, diluted and oxygenated, has ceased to hold a place in modern sanitary schemes. The precipitation of sewage, by which the solid matter is separated from the liquid and used as a manure or otherwise, has been the subject of numerous patents, and many chemicals have been employed for that purpose. Lime, lime and phosphate of alumina, and sulphate of iron have all been used with some degree of success.

In the A B C process the sewage is first clarified by blood, charcoal, and clay, and afterward treated with sulphate of alumina, producing a valuable manure. Irrigation—by which the sewage is directly applied to a piece of ground—has been fully tried in several localities, and many people consider it the most successful solution of the problem as to the ultimate disposal of sewage. The ground is carefully prepared, and the sewage allowed to flow over its surface by gravitation, and by this process the productiveness of the soil is enormously increased. But farmers will only use the liquid when their land requires it; consequently where this system is adopted the local authorities have had to add a farm trust to their many responsibilities, and the system is generally carried out at a heavy annual loss to the public. Filtration—the purification of sewage by causing it to filter through the earth—has been proposed in cases where land is very valuable or difficult to be secured for the disposal of sewage, on the supposition that this system will only require one acre for every 10,000 inhabitants. As the sewage passes down through the earth the air must of necessity follow it, the oxygen of which will re-aerate the earth and make it again fit for use. But the chief objection to precipitation, irrigation, and filtration is that they can only be applied at the outfall, and therefore have no beneficial influence on the sanitary state of the localities from which the sewers flow. The

## Seward

most successful methods of dealing with the sewage difficulty are based on the principle of keeping all excremental matters out of the sewers and dealing with them so as to prevent decomposition. In the U. S. the disposal of sewage has received the earnest consideration of sanitarians. Experiments have been made to destroy refuse of large towns by the use of fire or its equivalent. In New York harbor, at Governor's Island; in Baltimore, at the Johns Hopkins University; in Allegheny City, Pa., such attempts have been partially successful. In the city of Milwaukee, Wis., also in Des Moines, Iowa, large furnaces have been built with this end in view. In Pittsburg the Rider furnace has been approved of as meeting the object proposed. Dry-air closets, by which the noxious deposits are subject to a current of dry air, which renders them dry and changes them so as no longer to have the injurious effects of fecal discharges, are now being introduced. With regard to indoor drainage care should be taken to see that each trap connected either with bath, water-closet, sink, or fixed basin is ventilated to the open air, and the pipe from the bath, sink, or fixed basin should never pass into the trap of the water-closet, as the heated water promotes decomposition. The overflow pipe from the cistern should not open into the soil pipe, and the main soil pipe should be of iron, well covered with protecting composition. Cesspools should in all cases be abolished.

**Sewall**, ARTHUR, public man, was b. in Bath, Me., in 1835. He received a public school education and entered the shipbuilding business. He afterward became interested in the Bath Iron Works; was chosen president of the Bath National Bank; became director of the Maine Central Railroad, and afterward its president. In 1888 he was made a member of the Democratic National Committee, and in 1896 was nominated for the vice presidency by the Democratic party, but was defeated at the polls. Died 1900.

**Seward** (sū'ard), WILLIAM HENRY (1801–1872), statesman, b. in Florida, Orange co., N. Y. He studied for the bar, and began practising in Auburn in 1823, but gradually drifted into politics, and in 1830 was elected a member of the New York senate. Displaying marked abilities as a politician he was in 1838 and 1840 chosen governor of his native state, and in 1849 was elected to a seat in the U. S. Senate. He was the friend and adviser of President Taylor, and distinguished himself by his firm resistance to the extension of slavery. In 1860 he was a candidate for the presidency, but being defeated in the convention by Abraham Lincoln he exerted himself to secure Lincoln's election. Lincoln afterward nominated Seward as secretary of state for foreign affairs, in which post he discharged his duties with great ability. He was dangerously wounded in April, 1865, when Lincoln was assassinated, but recovered and fulfilled the same office under Lincoln's successor, Andrew Johnson. He resigned his post on the accession of President Grant in 1869. He

wrote a *Life of John Quincy Adams*; his *Speeches, Correspondence*, etc., appeared in 1869; and an *Autobiography*, with continuation, in 1877. Plate 4, Vol. I.

**Sewel'lel**, a small rodent animal of North America, inhabiting California, Oregon, and Washington. It has characters that unite it both with the beaver and the squirrels or marmots. It lives in colonies in underground burrows, and feeds on vegetable substances. It is about 12 in. long, stoutly built, and has almost no tail.

**Sewing Machines.**—The first attempts to devise machines for replacing hand labor in sewing are as old as the present century. The first machines were contrivances for imitating mechanically the movements of the hand in sewing. In the machines of Thomas Stone and James Henderson (1804) there were two pairs of pincers, one of which seized the needle below and the other above the cloth, and pulled it quite through on either side alternately. In Heilmann's machine, exhibited at Paris in 1834, the needle had the eye in the middle and a point at each end. This machine was intended for embroidery work. Previous to this (in 1830) Thimmonier and Ferrand had contrived a machine producing what is known as the chain-stitch. But the great disadvantage of this stitch is that the whole seam becomes undone if the end of the thread is pulled. In 1854 Singer, an American, devised a machine calculated to remedy this defect of the chain-stitch by means of a mechanism for tying a knot in the seam at every eighth stitch. But long before Singer's invention Elias Howe, a poor American mechanic, had invented the first really satisfactory sewing machine, for which he obtained a patent in May, 1841. Howe's machine used two threads, one of which passed through the eye of the needle, while another was contained in a small shuttle; and it produced a seam in which each stitch was firmly locked, so that it could not come undone by pulling. Many improvements have since been made by other inventors. The principle of the two threads and the lock-stitch has been adhered to in most of the machines that have been invented subsequently to that of Howe, but various details applying that principle have been altered for the better. In the Wheeler and Wilson machine the place of the shuttle is supplied by a reel which revolves in a vertical plane within a round piece of mechanism so contrived as to form a loop with the reel-thread, which becomes interlocked with that held by the needle. Of single-thread machines one of the best is that of Willcox and Gibbs, which, while it is easy, quick, and noiseless in working, makes a securer stitch than one-thread machines generally. Sewing machines have now been adapted to produce almost all kinds of stitching which can be done by the hand. Most sewing machines are worked by the foot, but many are worked by the hand, and some may be worked by either. Steam and electricity are also sometimes employed as a motive power for sewing machines. The manufacture of sewing machines is most

extensively carried on in the U. S. American sewing machines are sold all over the world.

**Sexagesimals** (or Sexagesimal Fractions), fractions whose denominators proceed in the ratio of sixty; as,  $\frac{1}{60}$ ,  $\frac{1}{3600}$ ,  $\frac{1}{216000}$ . These fractions are called also astronomical fractions, because formerly there were no others used in astronomical calculations. They are still retained in the division of the circle, and of time, where the degree or hour is divided into sixty minutes, the minutes into sixty seconds, and so on.

**Sextant**, an improved form of quadrant, capable of measuring angles of  $120^\circ$ . It consists of a frame of metal, ebony, etc., stiffened by cross-braces, and having an arc embracing  $60^\circ$  of a circle. It has two mirrors, one of which is fixed to a movable index, and various other appendages. It is capable of very general application, but it is chiefly employed as a nautical instrument for measuring the altitudes of celestial objects, and their apparent angular distances. The principle of the sextant, and of reflecting instruments in general, depends upon an elementary theorem in optics, viz, if an object be seen by repeated reflection from two mirrors which are perpendicular to the same plane, the angular distance of the object from its image is double the inclination of the mirrors. To find the angle between two stars hold the instrument so that the one is seen directly through the telescope and the unsilvered portion of the mirror, and move the index arm so that the image of the other star seen through the telescope by reflection is nearly coincident with the first, the reading on the arc gives the angle required; half degrees being marked as degrees, because what is measured by the index is the angle between the mirrors, and this is half that between the objects.

**Sextus Epir'icus**, a celebrated skeptic, who flourished in the first half of the third century A.D. He was probably a Greek by birth, and he is said to have lived at Alexandria and Athens. Skepticism appears in his writings in the most perfect state which it had reached in ancient times, and its object and method are more clearly developed than they had been by his predecessors. We have two works by him, written in Greek, one entitled *Outlines of Pyrrhonism*, explains the method of Pyrrho; the other, entitled *Against the Mathematicians*, is an attempt to apply that method to all the prevailing philosophical systems and other branches of knowledge.

**Seychelles** (sā-shel'), a group of about thirty islands in the Indian Ocean, between lat.  $3^\circ 40'$  and  $5^\circ 35'$  S., and lon.  $55^\circ 15'$  and  $56^\circ$  E. They were first occupied by the French, and were ceded to the British in 1814. The settlers are mostly of French extraction. The largest island is Mahé, the majority of the others being mere rocks. With the exception of two consisting of coral, they are composed of granite piled up in huge masses, and terminating in peaks. Most of them are covered with verdure, and yield good timber. Cotton, coffee, cocoa, spices, tobacco, maize, rice, and

## Seymour

tropical fruits are cultivated; and cocoanut oil, soap, vanilla, etc., exported. Pop. 16,021.

**Seymour**, Jackson co., Ind., 59 mi. s.w. of Indianapolis. Railroads: P. C. C. & St. L.; B. & O.; and E. & R. Industries: woolen mills, two flouring mills, grist mill, two furniture, ice, snath and spoke, gas and harness factories, three planing mills, sawmills, and other factories. Surrounding country agricultural. The town was first settled in 1818 and became a city in 1857. Population, 1900, 6,445.

**Seymour** (sē'mur), a noble English family of Norman origin. Their name is corrupted from St. Maur, which was their seat in Normandy. They acquired lands in Monmouthshire in the thirteenth century, and early in the fifteenth century added to these estates others in Somersetshire. The most conspicuous member of this family, SIR JOHN SEYMOUR, was the father of the third wife of Henry VIII and of Edward Seymour, who, on his sister's marriage in 1536, was raised to the peerage as Viscount Beauchamp, and the following year created Earl of Hertford. During the minority of Edward VI the Earl of Hertford caused himself to be appointed governor of the king and protector of the kingdom (January, 1547). The following month he obtained the post of lord treasurer, was created Duke of Somerset, and made earl marshal. The Earl of Warwick caused Somerset to be arrested in October, 1551; on a charge of treasonable designs against the lives of some of the privy councilors. He was tried, and beheaded on Tower Hill.

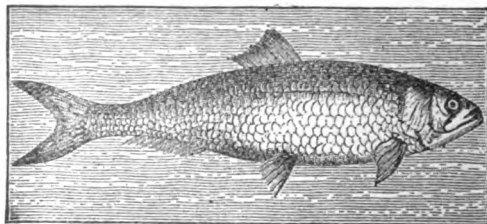
**Seymour**, HORATIO (1810-1886), statesman, b. in Pompey Hill, Onondaga co., N. Y. After serving three terms, with marked ability, in the New York Legislature, in 1852 was elected governor on the Democratic ticket. At the outbreak of the Civil War he was decidedly in favor of the supremacy of the constitution, and as governor showed conspicuous energy and ability in raising troops. In 1868 he was defeated for the presidency by General Grant. As an orator Mr. Seymour was easy, agreeable, and powerful, rising often into true eloquence.

**Sfax**, a town on the east coast of Tunis, situated in the midst of fruit gardens. It is surrounded by walls and bastions, and has a strong citadel. It exports large quantities of fruit, wool, sponges, alfa, etc. Sfax was captured by the French after a two days' bombardment on July 16, 1881. Pop. 30,000.

**Shad**, a name of several fishes, of the family of herrings, and including two species, the common or allice shad, and the twaite shad. The common shad inhabits the sea near the mouths of large rivers, and in the spring ascends them for the purpose of depositing its spawn. The form of the shad is the same as that of the other herrings, but it is of larger size, and in some places receives the name of "herring king." Its color is a dark blue above, with brown and greenish lusters, the under parts being white. The twaite shad is about a half less than the common species, and weighs on an average about 2 lbs. An American

## Shagreen

species of shad, varying in weight from 4 to 12 lbs., is highly esteemed for food, and is consumed in great quantities in the fresh state. They are found all along the coast from New



Common Shad.

England to the Gulf of Mexico, and have been successfully introduced on the Pacific Coast.

**Shaddock**, sometimes called *pompelmoose*, a large species of orange, attaining the diameter of 7 or 8 in., with a white, thick, spongy, and bitter rind, and a red or white pulp of a sweet taste, mingled with acidity. It is a native of China and Japan, and was brought to the West Indies by a Captain Shaddock, from whom it has derived its name.

**Shaftesbury**, ANTHONY ASHLEY COOPER, FIRST EARL OF (1621-83), was b. at Wimborne St. Giles's, in Dorsetshire, and succeeded to a baronetcy on the death of his father in 1631. When Cromwell turned out the Long Parliament, Sir Anthony was one of the members of the convention which succeeded; nevertheless he signed the protestation charging the protector with arbitrary government, which did not, however, prevent him from becoming one of his privy council. After the deposition of Richard Cromwell he aided the restoration of Charles II with all his influence, and in 1661 was created Baron Ashley, and appointed chancellor of the exchequer and a lord of the treasury. He afterward became a member of the obnoxious Cabal. In 1672 he was created Earl of Shaftesbury and lord high chancellor. In 1679 he became president of the council and the same year was instrumental in passing the Habeas Corpus act. In 1681 he was indicted for high treason but acquitted. He entered into the plots of the Monmouth party and had to fly to Holland, where he died. He is the Achitophel of Dryden's famous satire.

**Shag**, a species of cormorant, also called the crested or green cormorant, from its dark green plumage. Its average length is about 26 in. and its nest, composed of roots and stalks of seaweed lined with grass, is usually found on rocky ledges. The young birds have a brownish tint amid the green plumage, with brown and white under surfaces.

**Shagreen'**, a species of leather prepared without tanning, from horse, ass, and camel skin, the granular appearance of its surface being given by imbedding in it, while soft, the seeds of a species of plant, and afterward shaving down the surface, and then by soaking causing the portions of the skin which had been indented by the seeds to swell up into relief. It is dyed with the green produced by





ENGLISH POETS

William Shakespeare  
Geoffrey Chaucer

John Milton  
Edmund Spenser

Plate 33. Vol. IV

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## Shah Jehan

the action of sal-ammoniac on copper filings. It is also made of the skins of the shark, sea otter, seal, etc. It was formerly much used for watch, spectacle, and instrument cases.

**Shah Jehan** (d. 1666), the fifth Mogul emperor of Delhi, reigned from 1627 to 1658, when he was deposed by his son Aurengzebe. During his reign the Mogul Empire attained a great magnificence; he founded Delhi, where he erected the celebrated peacock throne, valued at \$32,500,000; built the Taj Mahal at Agra, a mausoleum to his favorite wife, and several other buildings which have become architecturally famous.

**Shahjehānpur**, a town in India, in the North-west Provinces, 95 mi. n. w. of Lucknow, in the executive district of same name. There is a cantonment at the place, an American Methodist mission station with churches and schools; and sugar works in the neighborhood. Pop. 74,830. The district forms the southwestern portion of the Patná Division; has an area of 4,365 sq. mi., and pop. 1,964,909.

**Shakers** (or shaking Quakers), a sect which arose at Manchester, in England, about 1747, and has since been transferred to America, where it now consists of a number of thriving families. The formal designation which they give themselves is the United Society of Believers in Christ's Second Appearing. That of Shakers was given them in ridicule, but is nevertheless passively accepted by them. The founder of the sect as it at present exists was Ann Lee, an expelled Quaker, b. in Manchester in 1756. She came to America in 1774 with seven followers and formed the first settlement at Watervliet, near Albany. They agree with the Quakers in their objections to taking oaths, their neglect of certain common courtesies of society, their rejection of the sacraments, etc. They believe in the immediate revelations of the Holy Ghost (gifts); maintain that the old law is abolished, the new dispensation begun; that intercourse between heaven and earth is restored; that God is king and governor; that the sin of Adam is atoned, and man made free from all errors except his own; that every human being will be saved; that the earth is heaven, now soiled and stained, but ready to be brightened by love and labor into its primeval state. At first the motions from which they derive their name were of the most violent, wild, and irregular nature—leaping, shouting, clapping their hands, etc.; but at present they move in a regular, uniform dance to the singing of a hymn, and march around the hall of worship, clapping their hands in regular time. The societies are divided into smaller communities called families, each of which has its own male and female head. Celibacy is enjoined upon all, and married persons on entering the community must live together as brother and sister. All property is held in common, and all bind themselves to take part in the family business—the men either as farmers, builders, gardeners, smiths, painters, or as followers of some other handicraft; and the women in some household occupation, or in the work of education. In

## Shakespeare

America there are about twenty communities with between two and three thousand members, chiefly in the New England States.

**Shakespeare, WILLIAM** (1564–1616), English poet and dramatist, was b. at Stratford-upon-Avon, a town in Warwickshire. His father was John Shakespeare, a burgess of Stratford, who combined his business as a butcher, a wool-stapler, and a glover, with dealings in timber and corn. His mother was Mary Arden, daughter of Robert Arden of Wilmechote, a prosperous yeoman farmer. They had eight children (four sons and four daughters), of whom William was the third. When the third son was born and for some time afterward the family was prosperous, for we find that in 1568 John Shakespeare was high-bailiff of Stratford. From this fact it may safely be inferred that his son received the best education which the grammar school of Stratford could give. After leaving school the first absolutely authentic event in Shakespeare's life is his marriage with Anne Hathaway, daughter of a yeoman in the hamlet of Shottery, near Stratford. The marriage bond is dated Nov. 28, 1582, at which date Shakespeare was in his nineteenth year, while, from the date on her tombstone, it is known that his wife was eight years older. On May 26 following, their first child named Susanna, was baptized, and in February of 1585 a son and daughter were born, who received the names of Hamnet and Judith. From this date until we find Shakespeare established in London as a player and dramatist there is a gap of seven years, during which we are again left to tradition and conjecture. To account for his leaving Stratford it has been suggested that his marriage with Anne Hathaway had proved unsuitable and unhappy, but there is no positive evidence in support of this belief. Then, again, there is the famous legend of the deer stealing for which it is said he was prosecuted by Sir Thomas Lucy, of Charlecote. In retaliation he wrote, according to Rowe, a satirical ballad, which so enraged the baronet that Shakespeare thought it prudent to leave Stratford. The more probable reason is, that his increasing domestic responsibilities, together with the acquaintance he presumably had with the players from London who visited Stratford, induced him to push his fortune in the city. He soon became a well-known player and a dramatist of such distinction as to call forth an envious reference in 1592 from a fellow dramatist. This is found in *A Groatworth of Wit*, written by Robert Greene, and published a few weeks after his death by Chettle.

The first date in Shakespeare's life after his arrival in London which is settled by clear evidence is 1593. In that year he published his *Venus and Adonis*, with a dedication of this, "the first heir of my invention," to Henry Wriothesley, earl of Southampton; and in the following year he dedicated to the same patron his other poem of *The Rape of Lucrece*. As suggesting that this patronage was substantial in its nature, there is a story to the effect that the earl at one time gave to Shakespeare \$5,000



to complete some purchase he had on hand. Whatever truth there may be in the story, it is certain that about this time Shakespeare began to grow in fortune and in fame. In connection with this increase of fortune it is noteworthy that the affairs of his father, John Shakespeare, seem also to have improved, for in 1596 he applied at the herald office for a grant of arms, which application was conceded in the following year. In 1596 Shakespeare's only son Hamnet died and was buried at Stratford, where the family continued to reside. The tradition is that Shakespeare visited his native town once a year during the time that he lived in London. However this may be, it is clear that his interest in Stratford was not founded entirely in sentiment or family affection, for we find that in 1597 he bought a substantial house called New Place for \$300, and in a return of grain and malt he is described as the holder of ten quarters. There is also documentary evidence to prove that he was possessed of property in the parish of St. Helen's, Bishopgate. That he was a man of some public importance in London is also indicated by a letter dated 1598, and still extant, in which Abraham Sturley suggests to Richard Quiney that by the friends of Mr. Shakespeare he might be helped to certain favors which they desired conferred on their native town of Stratford; and that the player and dramatist was a man able and likely to be generous with his friends is suggested by an extant letter in which this same Richard Quiney applies to Shakespeare for a loan of \$150. While these things indicate the growth of his material prosperity, we have proof that his fame as a lyrical poet and dramatist was also being securely established, for in 1598 there was published the *Palladis Tamia*, by Francis Meres, in which twelve of his plays are enumerated, and in which mention is made of his "sugared sonnets among his private friends." Yet, notwithstanding this literary activity, he was still a player, for when Jonson's comedy of *Every Man in his Humor* was produced in 1598, Shakespeare took part in the performance. In the following year we find that he was a shareholder in the Globe Theater, and his practical turn is still further evidenced by the fact that he bought (1602) 107 acres of arable land in the parish of Old Stratford for \$1,600, and acquired (1605) for \$2,200 the unexpired term of a lease of the tithes of Stratford, Old Stratford, Bishopston, and Welcombe. Along with these material possessions he received the style and title of William Shakespeare, Gentleman, of Stratford-on-Avon; but in London he was still a player in 1603, since we know that when Ben Jonson's play of *Sejanus* was produced in that year Shakespeare occupied a place in the list of actors. His father, John Shakespeare, had died in 1601; his eldest daughter Susanna had married, in 1607, a practising physician named John Hall; in the same year his brother Edmund, who was also a player, died in London and was buried in Southwark, the author of *Hamlet* paying twenty shillings for "a forenoon knell of the great bell;" and in 1608 his mother, Mary Shakespeare, followed her husband to the

grave. In February, 1616, his younger daughter Judith married Thomas Quiney, a vintner of Stratford; on the 25th of the following month he executed his will; and in another month he was dead. The cause of his death is unknown, but in Stratford there was a tradition "that Shakespeare, Drayton, and Ben Jonson had a merry meeting, and, it seems, drank too hard, for Shakespeare died of a fever there contracted." By his will he left the bulk of his property to Susanna Hall and her husband, his daughter Judith, his sister Joan, and his godson, while a few friends and fellow players were also remembered. To his wife he bequeathed specifically the "second best bed with the furniture;" for otherwise there would probably be ample provision made for her as a widow having right of dower in her husband's freehold property. He was buried in the chancel of Stratford church, on the north wall of which a monument, with bust and epitaph, was soon afterward set up. As for his character, as estimated by his contemporaries, it found fit expression in the words of Ben Jonson. "I loved the man," he said, "and do honor his memory on this side idolatry as much as any. He was indeed honest, and of an open and free nature, had an excellent phantasy, brave notions, and gentle expressions." Seven years afterward (1623) his wife, Anne Hathaway, died.

In classifying the plays of Shakespeare by the aid of such chronology as is possible, modern critics have found it instructive to divide his career as a dramatist into four marked successive stages. The first period (1588-93) marks the inexperience of the dramatist, and gives evidence of experiment in characterization, looseness in the construction of plot, with a certain symmetrical artificiality in the dialogue. To this stage belong: *Titus Andronicus* (1588-90) and part I *Henry VI* (1590-91), both of which, it is thought, Shakespeare merely retouched; *Love's Labor's Lost* (1590); *The Comedy of Errors* (1591); *The Two Gentlemen of Verona* (1592-93); *A Midsummer Night's Dream* (1593-94); parts II and III *Henry VI* (1591-92), in which it is thought probable that Marlowe had a hand; and *King Richard III* (1593). The second period (1594-1601) is that in which, with increased security in his art, the dramatist sets forth his brilliant pageant of English history, his brightest conception of the comedy of life, and more than proves his capacity for deeper things by one great romantic tragedy. To this stage belong: *King Richard II* (1594); parts I and II *Henry IV* (1597-98); *King Henry V* (1599); *King John* (1595); *Romeo and Juliet* (1596-97); *The Merchant of Venice* (1596); *Taming of the Shrew* (1597); *Merry Wives of Windsor* (1598); *Much Ado About Nothing* (1598); *As You Like It* (1599); and *Twelfth Night* (1600-01). The third period (1602-08) shows that the dramatist, having mastered all the resources of his art and tasted life to the full, is strangely fascinated by mortal mischance, so that even his comedy becomes bitter, while his tragedy is black with the darkest tempests of passionate human experience. To this stage in his development be-

## Shale

long: *All's Well that Ends Well* (1601-02); *Measure for Measure* (1603); *Troilus and Cressida* (1603); *Julius Caesar* (1601); *Hamlet* (1602); *Othello* (1604); *King Lear* (1605); *Macbeth* (1606); *Antony and Cleopatra* (1607); *Coriolanus* (1608); and *Timon of Athens* (1607-08). The fourth period (1609-13) is that in which Shakespeare, after having passed through a season which was probably darkened by his own personal experiences, suddenly attained the glad serenity of mind which enabled him to write his last romantic plays. To this period belong: *Pericles* (1608), which is only partly from Shakespeare's hand; *Cymbeline* (1609); *The Winter's Tale* (1610-11); *The Tempest* (1610); with (the doubtful) *Two Noble Kinsmen* (1612); and *King Henry VIII* (1612-13), which are partly by another writer, supposed to be Fletcher. Of non-dramatic pieces Shakespeare was the author of *Venus and Adonis* (1593), *The Rape of Lucrece* (1594), the *Sonnets* and *A Lover's Complaint* (1609); while it is agreed that only a few of the poems in the collection published under the name of *The Passionate Pilgrim* (1599) were written by him. Pl. 33, Vol. IV.

**Shale** is the solidified mud of ancient waters, and is various in color and composition, the chief varieties being sandy, calcareous, purely argillaceous, and carbonaceous. Shale is frequently found deposited between seams of coal, and commonly bears fossil impressions. The sub-variety known as bituminous shale burns with flame, and yields an oil, mixed with paraffin, of great commercial importance. Alum is also largely manufactured from shales of Lancashire, Yorkshire, and Lanarkshire.

**Shamanism**, a general name applied to the idolatrous religions of a number of barbarous nations in Northern Asia. The Shaman is a wizard priest who performs sacrifices and works magical spells. The worshipers believe in a Supreme Being, but to this they add the belief that the government of the world is in the hands of a number of secondary gods both benevolent and malevolent toward man, and that it is absolutely necessary to avert their malign influence by magic rites and spells.

**Shamokin**, Northumberland co., Pa., on Shamokin Creek, 50 mi. e. of Harrisburg. Rich deposits of anthracite coal in the south and east, and fertile farming lands in the north and west. Railroads: Pennsylvania; Lehigh Valley; and Reading. Industries: railroad repair shops, colliery, flouring mill, foundry, cracker bakery, hosiery factory, etc. The town was named by the Indian chief Logan; was first settled in 1835. Pop. 1900, 18,202.

**Shamrock**, the name commonly given to the national emblem of Ireland. It is a trefoil plant, generally supposed to be the plant called white clover, but some think it to be rather the wood sorrel. The plant sold in Dublin on St. Patrick's Day is the small yellow trefoil.

**Sham'yl** (1797-1861), a Caucasian chief, was b. in north of Daghestan. He studied Arabian grammar and philosophy under the Mollah Jelal-eddin, and became a disciple of Kasi-

## Shannon

Mollah, whose revival of Sufism had formed a bond of union among the tribes of Daghestan. In 1824 he joined Kasi-Mollah in the struggle which then broke out against the Russians. In this struggle he ultimately became the elected chief, and continued to resist the Russian power until 1859 when he was captured and taken to St. Petersburg. Here he was hospitably received by the czar, who provided him with a pension and a residence.

**Shanghai** (or Shanghai) (shang-hí'), a large city and seaport of China, province of Kiang-soo, on the Woosung or Whangpoo, about 12 mi. above its entrance into the estuary of the Yang-tse-kiang. The Chinese city proper is enclosed within walls 24 ft. high, the streets



Shamrock.

being narrow and dirty, and the buildings low, crowded, and for the most part unimportant. In 1843 Shanghai was opened as one of the five treaty ports, and an important foreign settlement is now established (with a separate government) outside the city walls. The Woosung here is about  $\frac{1}{2}$  mi. wide, and increases to over 1 mi. at its outlet into the Yang-tse, at the port of Woosung. Along the bank of the river extends a wide "bund" or quay, with a bulwark of stone and numerous stone jetties, for landing and loading cargo. In the foreign settlement there are a fine cathedral, municipal offices, hospitals, club-house, etc. A municipal council is elected by the Americans and English, and another by the French, whose quarter is separately administered. The subjects and citizens of each nationality are under the protection of their respective consuls. The Chinese authorities retain complete control over all shipping dues, duties on imports and exports, etc. Shanghai has water communication with about a third of China, and its trade since the opening of the port has become very extensive, the total of exports and imports together, native and foreign, amounting to \$270,000,000 in 1888. The chief imports are cottons, yarns, woolens, and opium; and the exports, silk, tea, rice, and raw cotton. The foreign population is about 3,000, and the native population is estimated at 300,000.

**Shannon**, the largest river of Ireland, rises at the base of Cuilcagh Mountain in County Cavan; flows southwest and south through loughs Allen, Boderg, Bofin, Ree, and Derg; divides Connaught from Leinster and Munster;

## Shansee

and enters the Atlantic by a wide estuary, at the mouth of which are Loop Head in Clare and Kerry Head in Kerry; length about 250 mi. This estuary begins a little below Limerick, and is navigable by large vessels, while small craft ply nearly the whole length of the river.

**Shansee'**, an inland province of Northern China, with an area of 65,950 sq. mi., is the original seat of the Chinese people, and in its lowland parts is well cultivated. The rivers, which are almost all tributaries of the Yellow River, are numerous, but not large. The chief grain crops are wheat and millet, and there are coal, iron, copper, and other minerals. The capital is Tae-yuen-foo. Pop. 14,000,000.

**Shan States**, a number of small semi-independent communities occupying a district n. of Siam and e. of Burmah, the boundary of which is not well defined. Each state is governed by a chief and a council; the nominal religion is Buddhism, and the practise of slavery is general. The people (Shans) have attained much proficiency in various handicrafts, and show great aptitude for trade.

**Shantung'**, a maritime province of China, on the Yellow Sea; area 53,760 sq. mi. The greater portion of this province is level. The chief river is the Yellow River or Hoang-ho, which, after traversing the province in a north-east direction, flows into the Gulf of Pe-che-lee. Wheat, millet, and indigo are the chief products, and the manufactures include silk, hempen cloths, felt, etc. It was in this province that Confucius was born. The capital is Tse-nan-foo, and the pop. 29,000,000.

**Shari**, a large river in Central Africa, which enters the southern side of Lake Tchad by several mouths after a course of about 700 mi. from the southeast.

**Shark**, the general name for a group of fishes, celebrated for the size and voracity of many of the species. The form of the body is elongated, and the tail thick and fleshy. The mouth is large, and armed with several rows of compressed, sharp-edged, and sometimes serrated teeth. The skin is usually very rough, covered with a multitude of little osseous tubercles or scales. They are the most formidable and voracious of all fishes, pursue other marine animals, and seem to care little whether their prey be living or dead. They often follow vessels for the sake of picking up any offal which may be thrown overboard, and man himself often becomes a victim to their rapacity. The sharks formed the genus *Squalus* of Linnaeus, which is now divided into several families, as the white sharks, basking sharks, Greenland sharks, dog fishes, etc. The basking shark is by far the largest species, sometimes attaining the length of 40 ft., but it has none of the ferocity of the others. The white shark is one of the most formidable and voracious of the species. It is common in many of the warmer seas, reaching a length of over 30 ft. The hammer-headed sharks, which are chiefly found in tropical seas, are very voracious, and often attack man. They are noteworthy for the remarkable shape of their head, which resembles somewhat a double-headed

## Shear Tails

hammer, the eyes being at the extremities. Other forms are the porbeagle, blue shark, fox shark, sea fox, sea ape or thresher, and Greenland or northern shark.

**Sharon**, Mercer co., Pa., 22 mi. n.w. of New Castle. Railroads: Erie & Pittsburgh; L. S. & M. S.; N. Y. L. E. & W. Center of a coal mining district. Chief industry is iron manufacturing, including furnaces, rolling mills, steel works, nail works, etc. It also has a horse collar factory, saw, planing, and flour mills, etc. Pop. 1900, 8,916.

**Sharpsburg**, Allegheny co., Pa., on Allegheny River, 5 mi. n.e. of Pittsburg. Railroads: West Pa. Div. Pennsylvania; P. & W., connecting with B. & O.; Allegheny Valley across Allegheny River. Industries: iron, and steel works, two glass and a lead factory. Surrounding country agricultural and mineral. The town was first settled in 1830 by James Sharp, and became a borough in 1842. Pop. 1900, 6,842.

**Shastra** (or Shaster), a law or book of laws among the Hindus; applied particularly to a book containing the authorized institutes of religion, and considered of divine origin. It is also used in a wider sense of treatises containing the laws or institutes of the various arts and sciences.

**Shaw**, HENRY W. (1818-1885), humorist, better known as "Josh Billings," was b. in Lanesboro, Mass. He received a common school education and entered Hamilton College, but soon left there to go west. For some time he was a deck hand on the Ohio River steamboats, and later became an auctioneer. In 1859 he wrote his *Essay on the Mule*, which attracted considerable attention. In 1863 he began lecturing, and became as successful on the platform as in literature. Among his books are *Josh Billings's Farmer's Almanax*; *Josh Billings, His Sayings*; *Josh Billings on Ice*; *Josh Billings's Complete Work*, and *Josh Billings's Spice Box*.

**Shaw**, LESLIE M. (1848—), ex-Governor of Iowa and Secretary of the United States Treasury; b. at Morristown, Vt., Nov. 2, 1848; educated at Cornell college, Mt. Vernon, Iowa, and Iowa College of Law. At the age of twenty-eight he began the practice of law in Denison, where he resided until 1896. He rose rapidly in his profession and became prominent in financial circles, being made president of the bank at Denison and also of the bank at Manila. He was governor of Iowa from 1896 to 1900. In December, 1901, he was appointed Secretary of the Treasury to succeed Lyman J. Gage, who resigned.

**Shea**, is a native of tropical Asia and Africa. The trunk of this tree, when pierced, yields a copious milky juice, and *shea* or vegetable butter is found in the nuts when crushed. The latter are the size of a pigeon's egg, and each tree yields about a bushel.

**Shear Tails**, a genus of humming birds, of which the slender shear tail and Cora's shear tail are two familiar species. These birds occur, the former in Central America, generally, the latter in Peru and in the Andes valleys.



## Sheath Bill

They derive their name from the elongation of the two central tail feathers of the males.

**Sheath Bill**, a bird belonging to the order Grallæ. They derive their name from the horny sheath which overlies the nostrils, and is continued back until it extends in a kind of hood, thickly feathered, covering the face. In appearance and flight they are not unlike pigeons, their plumage being dazzlingly white. They inhabit the islands of the southern oceans, more especially Kerguelen's Island and the Crozets.

**Sheboygan**, Sheboygan co., Wis., 137 m. n. of Chicago, on Lake Michigan. Railroads: C. & N. W., and M. L. S. & W. The leading industry is chair making. Some of the factories make about 4,000 chairs daily. Other industries are, furniture, leather, boot and shoe, wagon and carriage factories, stamped steel and cast-iron ware works and fisheries. Sheboygan has a fine harbor and large lake commerce. It exports fish, lumber, agricultural and manufactured products. Pop. 1900, 22,962.

**Sheep**, a ruminant animal, nearly allied to the goat. It is one of the most useful animals to man, as its wool serves him for clothing, its



Merino Ram.

skin is made into leather, its flesh is an excellent article of food, and its milk, which is thicker than that of cows, is used in some countries to make butter and cheese. The varieties of the domestic sheep are numerous, but it is not known from what wild species they were originally bred, although it is probable that the smaller short-tailed breeds with crescent-shaped horns are descended from the wild species known as the moufflon. The ordinary life of a sheep is from twelve to fifteen years, but it is usually fattened and sent to market at the age of two or three years unless its fleece be the object desired. The latter is shorn every year about the month of May.



Southdown Ram.

The first sheep were brought to the U. S. in 1609. Merinos did not appear until 1801; but now 95 per cent. of American sheep are mainly of merino origin, though the breeds have not been kept pure. The principal breeds are native, Spanish, and Saxon

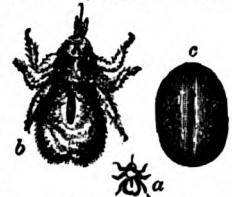
## Sheffield

Merinos; the New Leicesters or Bakewells, Southdowns, Cotswolds, Cheviots, and Lincolns. The Texas sheep are largely crossed with a Mexican breed, originally from the Basque provinces of Spain. Two races, originating in America, have been allowed to die out—the Smith's Island and the Otter breeds—the latter with a long body and short legs. Sheep-raising is carried on more or less extensively in Texas, New Mexico, in the Rocky Mountain states, in the uplands of the Southwest, in Ohio, and in the northern New England states. The merino variety of sheep originally belonged to Spain (where in summer they feed upon the elevated districts of Navarre, Biscay, and Aragon, and winter in the plains of Andalusia, New Castile, and Estremadura), but they are now reared in other parts of the Continent, as also in Australia and New Zealand. Their wool is long and fine, but the mutton is of little value. Mention may be made of the broad-tailed or fat-tailed sheep, common in Asia and Egypt, and remarkable for its large tail, which is loaded with fat; the Iceland variety, which has sometimes three, four, or five horns; the fat-rumped sheep of Tartary; the Astrakhan or Bucharian sheep, the wool of which is twisted in spiral curls of a fine quality; the Wallachian or Cretan sheep, which has long, large, spiral horns; and the Rocky Mountain sheep, notable for its large horns.

**Sheep Laurel**, a small North American shrub. It is a favorite garden shrub, and receives its name from its leaves and shoots being hurtful to cattle.

**Sheep's Head**, the name of a fish caught on the shores of Connecticut and Long Island. It is allied to the gilt-head and the bream, and is considered a delicious food. It receives its name from the resemblance of its head to that of a sheep.

**Sheep Tick**, a well-known dipterous insect belonging to the family of horse-flies. The pupæ produced from the eggs are shining, oval bodies which become attached to the wool of the sheep. From these issue the tick, which is horny, bristly, of a rusty ochre-color,



of a rusty ochre-color, and wingless. It fixes its head in the skin of the sheep, and extracts the blood, leaving a large round tumor. Called also *sheep louse*.

**Sheers**, a kind of apparatus for hoisting heavy weights, consisting of two or more poles erected in a mutually inclined position, and fastened together at the top, their lower ends being separated to form an extended base. The poles are steadied by guys, and from the top depends the necessary tackle for hoisting. Permanent sheers, worked by steam, are now used at loading wharfs and in dockyards.

**Sheffield**, a municipal and parliamentary borough of England, county of York (West Riding), situated on hilly ground at the junction

## Sheik

of the Sheaf and Don, about 160 mi. n. of London by rail. In the central parts great improvements have recently been made in the crowded streets by the corporation, and the suburban districts are well built and picturesquely situated. The chief ecclesiastical building is the ancient parish church of St. Peter's, in the Perpendicular style, and recently restored. Of educational and literary institutions there are the Free Grammar School, the Church of England Educational Institute, the Firth College, the Wesley College, Ranmoor College, the School of Art, and the St. George's Museum, founded by Mr. Ruskin. The principal buildings are the townhall, the Cutler's Hall, the Corn Exchange, the Music Hall, and the Albert Hall. There are numerous hospitals and charitable institutions. The trade of Sheffield is chiefly connected with cutlery, for which it has long been famous, and the manufacture of all forms of steel, iron, and brass work. The steel manufacture includes armor-plating, rails, engine castings, rifles, etc. There are also manufactures of engines, machinery, plated goods, Britannia-metal goods, optical instruments, stoves, and grates, etc. Sheffield is supposed to have been originally a Roman station. Edward I granted it a charter as a market town in 1296, and there is indication in Chaucer's writings that the town was then noted for its cutlery. But it is only since the beginning of this century that it has developed such importance as a manufacturing center. Pop. 380,717.

**Sheik** (shēk or shāk), a title of dignity properly belonging to the chiefs of the Arabic tribes, but now largely used among Moslems as a title of respect. The head of the Mohammedan monasteries, and the head man of a village, are sometimes called sheiks. The chief mufti at Constantinople is the Sheik-ul-Islam.

**Shek'el**, a Jewish weight and in later times a coin. The weight is believed to have been about 218 or 220 grains troy, and the value of the silver coin 60 cents. There were also half-shekels coined both of silver and copper. A shekel (weight) of gold was worth \$9.10. The shekel of the sanctuary is supposed to have been originally worth double the common shekel.

**Shelbyville**, Shelby co., Ind., 26 mi. s.e. of Indianapolis. Railroads: C. C. C. & St. L., and Pennsylvania lines. Industries: table co., three flouring mills, iron foundry, bicycle, baking powder, basket, gas, cigar, picture frame, and other factories, planing and saw-mills, machine shops. Two natural gas plants. The town was first settled in 1816 and became a city in 1822. Pop. 1900, 7,169.

**Shell**, a hollow projectile filled with a bursting charge of gunpowder or other explosive composition, and fitted with a fuse to fire it at the desired point. Shells are usually made of cast iron or steel, and for mortars or smooth-bore cannon are spherical, but for rifled guns are as a rule elongated. There are many kinds of shells. *Common shells* are simple hollow projectiles filled with powder. On explosion they

## Shelley

act like a mine. They are very effective in breaching earthworks or masonry. *Palliser shells* are made of mottled iron with pointed heads, nearly solid, and chilled white by being cast in iron molds. They are intended for use against armor-clad vessels; the chilled point, in virtue of its intense hardness and great crushing strength, penetrates to an extraordinary depth. *Steel shells* of similar power have also been made. *Shrapnel shells* are shells filled with bullets, and with a small bursting charge just sufficient to split the shell open and release the bullets at any given point. *Segment shells* are of the nature of shrapnel. They contain iron segments built up round the inside of the shell. From their construction they are inclined to spread much more than shrapnel on bursting, and they should consequently be fired to burst close to the object. With percussion fuses great results are produced.

**Shelley**, PERCY BYSSHE (1792-1821), b. at Field Place, Horsham, Sussex; was the son of Sir Timothy Shelley, a landed proprietor of ancient family, and was educated at Sion House School, Brentford, at Eton, and at University College, Oxford. After leaving the university he completed his poem *Queen Mab*, begun some time previously, and privately printed in 1813. His first great poem, *Alastor*, or the *Spirit of Solitude*, saw the light in 1816; and this was followed, in 1817, by the *Revolt of Islam*, a poem in the Spenserian stanza. In 1811, after his expulsion from college he eloped to Edinburgh with Harriet Westbrook, the daughter of a retired innkeeper. She was sixteen years of age, his own age being nineteen. The marriage turned out unhappily, and after nearly three years of a wandering, unsettled life Mrs. Shelley returned with two children to her father's house. In November, 1816, she committed suicide by drowning. Shelley was deeply affected by this event, but soon after married Mary Goodwin, with whom he had visited the Continent in 1814, and by whom he already had a child. Partly from his lungs being affected, and partly from anxiety lest he should be deprived of the children of his second marriage, Shelley left England finally in March, 1818, and the whole short remainder of his life was passed in Italy. On July 8, 1821, he was sailing along with a Mr. Williams in the Bay of Spezia when both were drowned by, as was long believed, the upsetting of the boat through a sudden squall; but there is some suspicion that the boat was purposely run down by an Italian felucca for the sake of plunder. According to the quarantine laws of Tuscany the bodies were burned, and the ashes of Shelley were deposited by his friends in the Protestant burying ground of Rome. The most popular of his works are his minor poems, which appeared from time to time along with his larger pieces, particularly the *Cloud* and the *Skylark*. His principal poems, besides those already mentioned, are *Rosalind and Helen*, and *Julian and Maddalo* (the latter a poem recording some of his intercourse with Byron), produced in 1818;

## Shemaha

the *Cenci* and the *Prometheus Unbound*, in 1819; the *Witch of Atlas* in 1820; and the *Epipsychidion*, the *Adonais* (an elegy on Keats), and the *Hellas*, in 1821. Pl. 7, Vol. I.

**Shem'aha**, a town of Russia, in Transcaucasia, about 70 mi. n.w. of Baku. In recent times it has suffered severely from earthquakes. Silk manufacture is the principal industry. Pop. 25,000.

**Shenandoah**, Schuylkill co., Pa., 13 mi. n. of Pottsville. Railroads: Pennsylvania; Lehigh Valley; and Philadelphia & Reading. Chief industry is coal mining and shipping. Some of the largest collieries of the Schuylkill anthracite coal region are located here, with an output of about 1,500,000 tons annually. Pop. 1900, 20,321.

**Shenandoah**, a river of the U. S., which flows n.e. through the valley of Virginia, and immediately below Harper's Ferry joins the Potomac, of which it is the principal tributary. Its length is 170 mi., the greater part of which is navigable for boats. The valley of the Shenandoah was the scene of numerous military operations in the American Civil War, and was devastated by General Sheridan in 1864.

**Shen-se**, a province of China, bounded on the n. by the Great Wall, and on the e. by the Yellow River; area 80,900 sq. mi. It is purely an agricultural province. From Se-gan Foo, the provincial capital, and anciently the capital of the empire, radiate a number of roads going east, south, and west, and Shen-se is the great channel of communication between China and Central Asia. Pop. 8,276,967.

**Sheol**, a Hebrew word frequently occurring in the Old Testament, and rendered in the Septuagint by "hades," in the Authorized Version by "grave," "pit," and "hell," but in the Revised Bible of 1885 never, except in one instance, by the last term. It was, as originally conceived, the gloomy under-world, the abode of ghosts or spirits of the dead. No retributive idea was connected with it until the time of the exile.

**Shepherd's Dog**, a variety of dog employed by shepherds to assist in tending the flocks, remarkable for its intelligence and usefulness. It is generally of large size, and of powerful, lithe build. The tail is inclined to be long, and possesses a bushy fringe. The muzzle is notably sharp. The eyes are large and bright. The limbs are strongly made, and the whole frame betokens an adaptation to an open, outdoor life. Of all strains of shepherd's dog the Scotch collie or colley is the most celebrated.

**Shepherd's Purse**, a plant of the natural order Cruciferae. It is an annual weed, found in all temperate climates, having simple, or cut leaves, and small white flowers. It is found everywhere, in fields, pastures, and roadsides.

**Sherbrooke**, Sherbrooke co., province of Quebec, at junction of St. Francis and Magog rivers. Railroads: Grand Trunk; Boston and Maine; Canadian Pacific, and Quebec Central. Industries: woolen cloth mills, flouring mill, iron foundry, drill co., many sawmills,

## Sheridan

cigar, cracker, corset, and other factories. Surrounding country agricultural and mineral. The town was first settled about 1800 and became a city in 1875. Pop. est. 1897, 11,000.

**Shere Ali Khan** (1823-1879), Amir of Afghanistan, succeeded his father, Dost Mohammed, in 1863. During the earlier part of his reign he passed through many vicissitudes, but by 1868 he was fully established on the throne of Kabul. In 1869 he entered into friendly relations with the Indian government. These friendly relations continued till 1878, when a Russian mission was received with honor at Kabul, while shortly afterward permission was refused for a British mission to cross the frontier. Thereupon the British invaded Afghanistan and took possession of the Khaiber Pass and the Kuram Valley. Shere Ali fled from Kabul, accompanied by the members of the Russian mission, and d., a fugitive, in Afghan Turkistan. He was succeeded by his second son, Yakub Khan, who, on account of the Cavagnari massacre, was speedily deposed and deported to India, and was succeeded by his cousin, Abdur Rahman Khan, in 1880.

**Sheridan**, PHILIP HENRY (1831-1888), general, and the greatest cavalry leader produced by the Civil War, was b. in Albany, N. Y., graduated at the Military Academy, West Point, in 1853, and from 1855 to 1861 served on the frontiers of Texas and Oregon. At the outbreak of the Civil War he was a captain in the Thirteenth Infantry. Having greatly distinguished himself in the earlier battles of the war, in April, 1864, Grant appointed him chief of cavalry of the Army of the Potomac, and he made several daring cavalry raids into the South. His ride from Winchester to Cedar Creek, a distance of 20 mi., in October, 1864, which turned a Federal defeat into a brilliant victory, is known as "Sheridan's Ride." During the final advance upon Richmond he was Grant's right-hand man; he fought the battle of Five Forks, which necessitated Lee's evacuation of Richmond and Petersburg; and as Lee fled he constantly harassed and attacked him until he compelled his surrender at Appomattox Court-house, April 9, 1865. After the war he held various military commands. In March, 1869, he became lieutenant general, and in February, 1883, on the retirement of Sherman, he succeeded to the command of the army. An account of his military career, written by himself, appeared in 1889. Pl. 29, Vol. IV.

**Sheridan**, RICHARD BRINSLEY BUTLER (1771-1816), was b. at Dublin, his father being Thomas Sheridan, actor, and latterly teacher of elocution. He was sent for a short time to a school in Dublin, and in 1762 to Harrow, where he did not distinguish himself. His best-known works are *The Rivals* (1775), *The Duenna*, and *The School for Scandal* (1777), the latter being his most famous comedy. He never became a statesman, but his fame soon rose high as an orator. His greatest effort was his "Begum" speech on the impeachment of Warren Hastings (1787), which Pitt said "surpassed all the eloquence of ancient and modern times."



## Sheriff

**Sheriff**, in the U. S., the office of sheriff is mainly ministerial; the principal duties being to maintain peace and order, to attend courts as administrative officer, to guard prisoners and juries, to serve processes and execute the judgments of the courts, and to preside at inquisitions. In most of the states the sheriff is elected by the popular vote, and the shrievalty in such places as New York is a highly paid and highly coveted political office. In all the states there are deputy sheriffs, who are the servants and agents of the sheriff; and in some of the states there is an under sheriff, who does duty for the sheriff in his absence.

**Sherman**, Grayson co., Tex., 280 mi. n.e. of Austin. Railroads: Texas & Pacific; Houston & Texas Central; St. L. & S. W., and M. K. & T. Cotton, grain, and live stock are raised in the vicinity. Industries include cotton seed oil mill, nursery, ice factory, flour mills, cotton compresses, bag and rope factory, etc. Pop. 1900, 10,243.

**Sherman**, WILLIAM TECUMSEH (1820-1891), American general, was b. at Lancaster, O., graduated at the military academy, West Point, in 1840, and served in Florida, Mexico, and elsewhere till 1853, when he resigned his commission. On the breaking out of the Civil War he offered his services to the U. S. government, and was appointed colonel of the Thirteenth Regiment of Infantry. He was present at the battle of Bull Run, greatly distinguished himself at Shiloh, and subsequently took a prominent part in the operations under Grant around Vicksburg and Memphis. In March, 1864, he succeeded Grant as commander of the military division of the Mississippi, and at the beginning of May, simultaneously with Grant's advance in the east, he entered upon his invasion of Georgia. On September 1, after a number of battles, he received the capitulation of Atlanta, and on December 21, of Savannah; and then turning northward into the Carolinas and fighting more battles, he received the surrender of Gen. J. E. Johnston, at Durham station, April 26, 1865, a surrender which brought the war to a close. Sherman was made a major general in August, 1864, lieutenant general in July, 1866, and general in March, 1869. He was retired in 1884. Pl. 29, Vol. IV.

**Sherman**, JOHN, statesman, b. in Lancaster, O., in 1823, admitted to the bar in 1844. In 1855 was elected to Congress. As a ready and forcible speaker he was an acknowledged power from the first. He grew rapidly in reputation as a debater. In 1861 he became U. S. senator, rendering valuable service in strengthening the public credit. He was appointed secretary of the treasury in 1877, and secured the resumption of specie payment. In 1881 he was again elected U. S. senator; re-elected in 1892. In 1897 he was appointed secretary of state, but resigned in April, 1898. Died Oct. 22, 1900.

**Sherry**, a Spanish wine made in the neighborhood of Xeres de la Frontera, in the province of Andalusia, near Cadiz. It is largely imitated and adulterated.

**Shetland**, or Zetland, an insular county of

## Shiloh

Scotland, about 50 mi. n.e., of Orkney; area 352,876 acres. It consists of about ninety islands and islets, of which twenty-nine are inhabited, the largest being the following: Mainland, Yell, Unst, Whalsey, Fetlar, and Bressay, the first occupying about three-fourths of the whole area of the group. The principal crops are black oats, bere, turnips, and potatoes. There is almost a total absence of trees. The live stock, including cattle, horses, and sheep, were until recent years remarkable for their diminutive size, but these animals have been improved in size and value by crossing them with breeds from the south. The Shetland pony is well known, and is not surpassed by any horse of its dimensions for strength and hardihood. The fisheries, especially the herring fishery, are very valuable, and afford the chief employment. The knitting of woolen articles may be said to be the only native manufacture. The only town is Lerwick. Pop. of county 28,711.

**Shields**, SOUTH, a municipal and parliamentary borough of England, in the county of Durham, near the mouth of the Tyne, opposite to North Shields, and communicating with it by steam ferry. The industries comprise glass, earthenware, alkali and chemicals, cordage, steam-engine boilers, and chain cables and anchors, besides shipbuilding. The ports of North Shields and South Shields carry on a very extensive trade, particularly in coal from the extensive collieries in the vicinity. Pop. 56,875.

**Shiites** (shi'itiz), one of the two great sects of Mohammedans, who do not acknowledge the *Sunna* as a law, and believe that Ali, the fourth caliph after Mohammed, was his first lawful successor. The Persians are Shiites.

**Shikarpur**, chief town of Shikarpur District, Sind Province, Bombay Presidency, India, 18 mi. w. of the Indus and 26 s.e. of Jacobabad. It is an emporium for transit trade between the Bolan Pass and Karachi, but has lost much of its commercial importance since the opening of the Indus Valley Railway. The principal manufactures are carpets and coarse cotton cloth. Pop. 42,496.

**Shilling**, an English silver coin, equal in value to 12 bronze pence or one-twentieth of a pound sterling, and approximate in value to 25 cents, to 1.25 French francs, and to 1.11 German marks.

**Shiloh** (battle of), one of the most memorable battles of the Civil War. Shiloh is in Tennessee, 2 mi. w. of Pittsburg Landing, on the Tennessee River, and took its name from a log chapel known as "Shiloh Church." The battle was fought April 6 and 7, 1862, Grant and Sherman leading the Federals, and A. S. Johnston and Beauregard the Confederates. The first day the Confederates taking the Federals by surprise, drove them from their lines, with heavy loss in men and guns; but the second day the Federals, having received reinforcements, and largely outnumbering the Confederates, regained their lines, and forced the Confederates to retreat to their former position at Corinth.

## Shingle.

**Shingle**, a thin piece of wood resembling a roofing slate, and used for the same purpose and in the same way. In the U. S., and other places where timber is plentiful, shingles are extensively used for a roof covering. They are usually cut by ingenious machinery devised for the special purpose.

**Shinto'ism**, one of the two great religions of Japan. In its origin it was a form of nature worship, but the essence of the religion is now ancestor worship and sacrifice to departed heroes.

**Shiagoon'** (or Tycoon'), the title of the hereditary military ruler of Japan for many centuries till the revolution of 1868, which reinstated the mikado in power.

**Ship**, in general, any large sea-going vessel. In a more restricted sense it signifies a vessel intended for distant voyages, in distinction to a *boat*, a term which includes all navigable vessels, and in a still more limited sense, a ship is a sailing vessel, with a bowsprit and three masts (fore, main and mizzen), each having three parts (lower mast, top mast and topgallant mast), and all rigged with a certain number of square sails. (See figure.) When there is a fourth mast it is called a jigger. But the development of steam navigation has

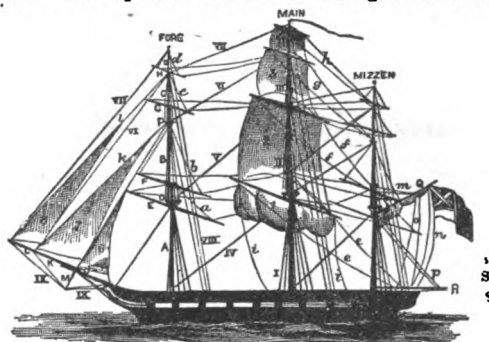


Diagram of Ship.

**Spars, etc.**—A, mast; B, topmast; C, topgallant-mast; D, royal mast; E, yard; F, topsail yard; G, topgallant sail yard; H, royal yard; J, bowsprit; K, jib boom; L, flying jib boom; M, martingale; N, chains; O, top; P, crosstrees; Q, gaff; R, spanker boom.

**Sails.**—1, course; 2, topsail; 3, topgallant sail; 4, royal; 5, spanker; 6, fore topmast staysail; 7, jib; 8, flying jib.

**Standing Rigging.**—I, shrouds; II, topmast shrouds; III, topgallant shrouds; IV, stay; V, topmast stay; VI, topgallant mast stay; VII, royal stay; VIII, backstays; IX, martingale stays.

**Running Rigging.**—a, lifts; b, topsail lifts; c, topgallant sail lifts; d, royal lifts; e, braces; f, topsail braces; g, topgallant braces; h, royal braces; i, sheet; k, jibstay; l, flying jibstay; m, peak halyards; n, signal halyards; o, vangs; p, topping lifts.

**Note.**—The corresponding rigging, etc., on the different masts have the same names, prefaced by the name of the mast; such as *Fore* topsail yard, *Main* topsail yard, *Mizzen* topsail yard, etc. See also *Sails*.

greatly enlarged the scope of the term ship, so that it now includes steam vessels as well as all kinds of sailing craft, such as men-of-war, transports, merchantmen, barks, brigs, schooners, sloops, galleys, barges, etc.

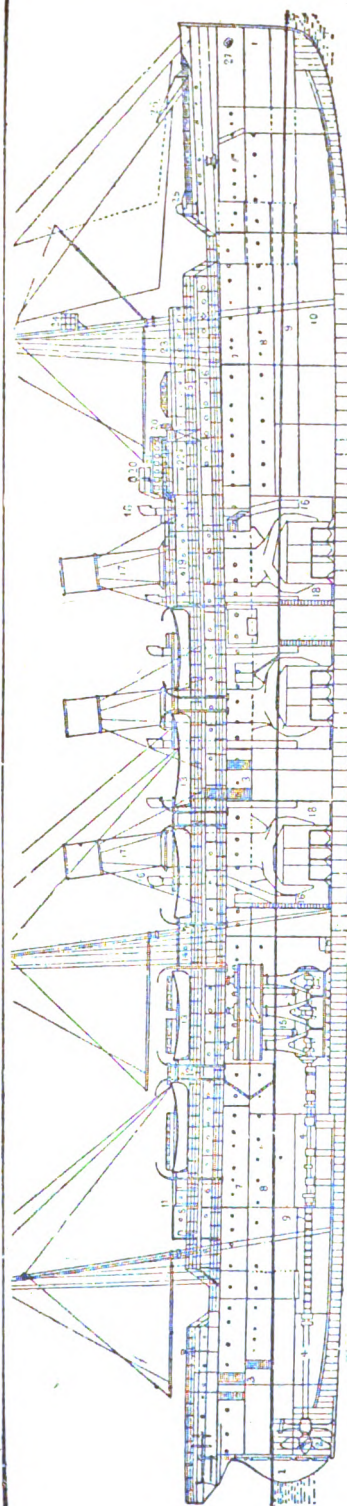
All modern forms and styles of ships have

## Ship

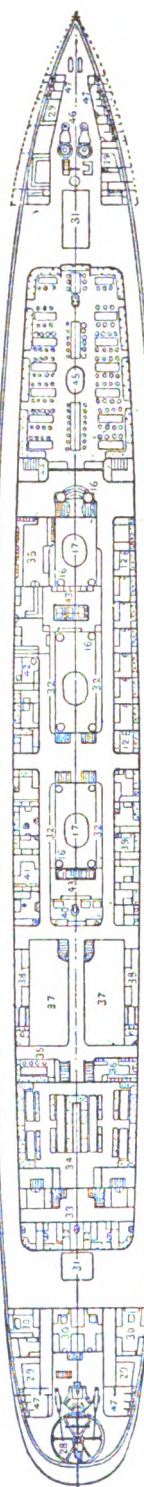
been evolved from one or both of the two fundamental and original forms, viz., the canoe and the raft. The former gave ideas of lightness, grace, speed; the latter of steadiness, capacity and buoyancy. For many centuries, but two means of propulsion were known, oars and sails. The Phenicians, the greatest commercial people of antiquity, made great progress in the art of shipbuilding; the Romans also had a well-developed art, and before them, the Egyptians. But with the tide of barbarism which swept over Europe at the downfall of the last great ancient empire, the science of shipbuilding was almost lost, and the western peoples to whom the world's progress was henceforth entrusted, were compelled to begin anew, and build up from their own resources, new models. The chief events which gave impetus to the development of the art were the invention of the compass, the discovery of America and of a passage to India. Spain, the great maritime nation of the early modern era, followed by France and Holland, and later still by England, made the first important advances. The last of these nations has the credit for building the first three-decker (1637), known as the *Sovereign of the Seas*. Superiority in the art shifted again to France, who, by the latter half of the 18th century, had produced models vastly in advance of anything before constructed. After the independence of the United States was achieved she rapidly forged to the front and soon took the lead in the art of shipbuilding. In 1832, Scott Russell demonstrated the theoretical principles upon which the speed of ships is based, and these were immediately applied with success by both American and foreign builders. The Baltimore clipper schooners were the first results of the application of true principles of construction. They had sharp bows, deep stern, were very long and lay low in the water, had long, slender masts and large, skillfully cut sails. The square-rigged vessels also adopted these principles, and the result was the fastest, safest ships then constructed, which played a large part in the development of the oriental trade of both England and America.

The next great revolution in the art of shipbuilding came with the application of steam to ship propulsion. Wood now gave place to iron, and iron finally to steel as the material of construction. The *Great Western*, launched in 1837, was the first steamship built expressly for regular trips between England and America. She was propelled by paddles, but soon thereafter Ericsson's screw propellers were adopted almost universally. From that time progress was rapid, till at the beginning of the twentieth century, the possibilities of the science seem to be nearly exhausted. Great Britain still leads all nations in the tonnage of ships built, but the United States leads in the number constructed, as is shown by the following figures: In 1900 there were built in Great Britain, 1,433 ships, with a total tonnage of 944,267 tons. The same year, there were built in the U. S. 1,447 ships, with a total tonnage of 393,790 tons. The names of Cramp and Roach are known the

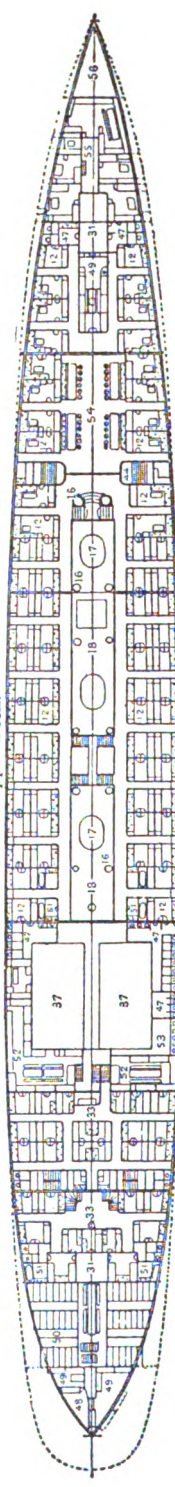




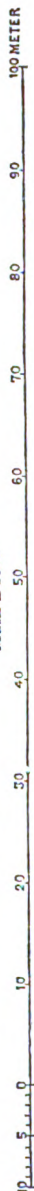
View of Longitudinal Section.



Upper Deck.



Main Deck.



Fast Sailing Propeller, AUGUSTA VICTORIA, of the American Packet-Boat Stock Company.

Displacement, 7,642 tons; 12,500 indicated Horse-power. Room for 270 Passengers in First Cabin, 150 in Second Cabin, 700 in Third Cabin, or Steerage Passengers.

1. Rudder. 2. Screw. 3. Downward Passages. 4. Shaft of the Screw. 5. Promenade Deck. 6. Upper Deck. 7. Principle Deck. 8. Steering. 9. War Deck. 10. Space for Ladies Saloon. 11. Officers Room. 12. Cabin, Second-class. 13. Boats. 14. Smoking Room of First-class. 15. Machinery. 16. Ventilators. 17. Smokestacks. 18. Boiler-room. 19. Lanthorn. 20. Upper and Lower Bridge of Commanders. 21. Room for Card Playing. 22. Music Hall. 23. Ladies Saloon. 24. Crow's Nest, for a View. 25. Position for Chain Hawse. 26. Crane, Machinery to Raise the Anchor. 27. Chain Hawse. 28. Steam Steering Apparatus. 29. Wash-rooms. 30. Hospital. 31. Hatchways. 32. Light Shaft. 33. Second-class Cabin. 34. Second-class Saloon. 35. Storeroom for Provisions. 36. Pantry. 37. Machine Shaft. 38. Rooms for Ship's Crew. 39. Rooms for Machinists. 40. Bakery. 41. Confectioner's Shop. 42. Slaughter House. 43. Kitchen. 44. Air and Light Shaft. 45. First-class Saloon. 46. Anchor Windlass. 47. Water Closets. 48. Room for Sailors. 49. Room for Stewards. 50. Steerage Passengers. 51. Bath-rooms. 52. Room for Firemen. 53. Washroom for Firemen. 54. First-class saloon. 55. Rooms for Sailors and Firemen. 56. Room for Cable.



## Ship

world over as builders of the finest types of merchant and battle ships. These yards are both situated on the Delaware River, but there are also large shipbuilding yards at San Francisco, New York and other ocean ports. The modern ocean liners are models of beauty, safety and convenience. Some of these are over 700 ft. in length, have a capacity of 12,000 to 15 000 tons, and engines generating from 30,000 to 35,000 horsepower. These largest vessels are propelled by steam, but mammoth sailing ships are also constructed, rarely, however, with a capacity of over 5,000 tons. Steel ships now predominate, as they are much lighter, easier of construction, more manageable upon the water, less easily damaged and far more durable. In wooden ships, the *keel* is the base of the structure; from it rise, on both sides, many *ribs*, consisting of strong timbers curved to the shape desired in the hull. Over these are bolted the outer planks, the spaces between which are *calked* to prevent leaking. Beams extend from side to side on the interior to support the decks. In steel ships, the *keel* is of much less importance, since the sides or walls, and all adjacent parts are mutually supporting. The ribs are fastened to the keel (which consists of plates riveted together), and about the outside of the ribs are riveted large steel plates. Often there is an inner sheet of plating, also. All girders and supports are of iron or steel. The floors of the decks are of wood. Many safety appliances are also provided, such as airtight compartments, to prevent sinking, etc.

From what has been said it is evident that the science of ship designing is at once important and intricate. The conditions that confront the naval architect are innumerable and present problems that demand for their solution the application of high mathematical principles and computations, combined with the most minute experimental observations. The ship must have graceful lines, must possess a certain capacity for cargo, and also must be able to carry a certain number of passengers; her engines must be capable of propelling her at a certain speed, and her shape must be conducive to allowing such speed with economy of fuel; she must be able to stow enough coal to last during the trip at a rate of about 500 tons a day for fast boats like the *Deutschland*, and about 260 tons for the larger, slower boats. She must be safe but light, must withstand shocks firmly, and be built so that she will return to erect position when turned slightly to the side.

The average cost of a fully equipped man-of-war is about \$3,000,000, while that of a merchant or passenger vessel is somewhat less. The largest German steamers of the latter class are *Kaiser Wilhelm der Grosse*, and *Kron Prinz Wilhelm*. But the largest steamer in the world is the new English ocean liner, the *Baltic* of the White Star Line. The length of the *Baltic* is 725 feet, 9 inches. The beam is 75 feet and the depth 49 feet. The gross tonnage is 23,000, the cargo capacity about 28,000 tons and the total displacement at the low draft approximately 40,000 tons. The total complement of passengers is 3,000 and the crew num-

## Ship Worm

bers about 350. The general arrangement of this ship is similar to that of its sister vessels, the *Oceanic*, the *Celtic* and the *Cedric*—a continuous shade deck running fore and aft, with three tiers of deck houses and two promenade decks above same. On the upper promenade deck is the first class smoking-room and library and the two houses below contain the deck state-rooms. The vessel is not speedy. Her maiden trip from Liverpool to New York occupied 7 days, 13 hours, 37 minutes. On this trip the 48 furnaces consumed only 235 tons of coal a day. The *Baltic* is fitted with all the latest devices tending to insure safety. Among these is the electrical indicator. This is placed on the bridge and indicates the exact position of any other vessel entering its magnetic zone. This enables the officer on the bridge to estimate the exact time he is distant from the other vessel and act accordingly so as to clear it.

**Ship Canal.** See *Canal*.

**Shipka Pass,** a pass in the Balkans, about 4,600 ft. above the sea, the scene of a desperate and bloody ten days' struggle during the Russo-Turkish War (August and September, 1877). In his futile endeavors to take Fort Nicholas at the summit of the pass from the Russian, Suleiman Pasha lost 20,000 of his best men.

**Ship Railway,** a railway composed of several tracks, with some sort of carriage for transporting vessels from one body of water to another. Capt. J. B. Eads's proposed plan for the Tehuantepec Ship Railway across the isthmus between North and South America in Mexican territory, consists essentially of a series of some eight or ten tracks, having a carrying car or cradle of some five sections, with altogether 1,000 wheels. Calculated for a vessel of 10,000 tons, this would not give a pressure so great as that of an ordinary locomotive. A ship railway is in course of construction by the Canadian government between Chignecto Bay, in the Bay of Fundy, across the isthmus to Northumberland Straits, a distance of 17 mi. This will enable vessels to go from Prince Edward Island to St. John, N. B., in twelve hours, and will greatly facilitate the transport of grain in bulk from the lake ports to New Brunswick. The vessels will be raised by hydraulic pressure a height of 40 ft. to the level of the railway, and placed on a double track 18 ft. from center to center.

**Ship, REGISTRATION OF.**—In the U. S. the navigation laws require all vessels to be registered periodically, and steam vessels to be inspected and certificated. A list of merchant vessels is published analogous to Lloyd's list issued in London. The Bureau of Navigation, in the treasury department at Washington, has charge of registration.

**Ship Worm,** the popular name of a mollusk distinguished by the elongation of the respiratory "siphons" or breathing tubes conveying water to the gills, which give to this mollusk a somewhat vermiform or wormlike aspect. The two valves or halves of the shell are of small size and globular shape, and are situated at its

## Shiraz

anterior extremity, the valves being three-lobed. In length the ship worm averages about a foot, and in thickness about  $\frac{1}{4}$  in. It has gained great notoriety from its boring habits, occasioning great destruction to ships and submerged wood by perforating them in all directions in order to establish a habitation. In boring into wood (the shell is the boring instrument) each individual is careful to avoid the tube formed by its neighbor, and often a very thin film of wood is left between the cavities, which are lined with a calcareous incrustation. Various plans are tried to protect ships, piers, etc., from this destructive animal, such as copper sheathing, treating with creosote, etc.; but the plan which appears to have been most successful in arresting its ravages is that of driving a number of short nails with large heads into the exposed timber. The rust from the heads of the nails appears to prevent its operation. A large species of teredo occurs in warm latitudes, where it bores into the hardened mud or sand of the sea bed, as well as into timber.

**Shiraz'**, a celebrated city of Persia, capital of the province of Fars, 165 mi. n.e. of Bushire. It is situated at an elevation of 4,500 ft. above the level of the sea, in a large and fertile plain covered with rose gardens, vineyards, cypress groves, and orchards. Founded about the beginning of the eighth century, it was long one of the most splendid cities of Persia, the residence of the ruler, the seat of science and art, celebrated for its magnificent buildings, its fine climate, its elegant manufactures, and its extensive trade. It lost much of its importance after being conquered by Timur in the end of the fourteenth century, and it was almost entirely destroyed by an earthquake in 1812, and again in 1853. At present it is known chiefly for its wines and its inland work. Near the city are the tombs of Sadi and Hafiz, the poets. Pop. 32,000.

**Shiré** (shé' rā), a river of Southeastern Africa, draining Lake Nyassa into the Zambesi, which it enters on its left bank, after a course of about 270 mi. nearly due south. It is navigable throughout its entire length, with the exception of about 35 mi. of falls and rapids, during the course of which it descends as much as 1,200 ft.

**Shirwa** (or Tamandua), a lake of Southeast Africa, lying on the left side of the Shiré, to the s.e. of Lake Nyassa. It is a secluded basin, lying at an elevation of 2,000 ft. above the sea, and surrounded by mountains which reach a height of 7,000 to 8,000 ft. It is mostly shallow, and infested by hippopotami and crocodiles.

**Shittim Wood**, of which the tabernacle in the wilderness was principally constructed, was the wood of the shittah tree of the Bible, which is supposed to be the *Acacia seyal* of the Sinaitic peninsula. It is a light but cross-grained and enduring wood, of a fine orange-brown color.

**Shoa**, a province in the southeast of Abyssinia, often holding the position of a semi-independent kingdom; area 26,000 sq. mi. It

## Shoddy

consists (like the rest of Abyssinia) mostly of plateaus reaching up to an elevation of 10,000 ft. on the southeast and south, overtopped by higher mountains, and intersected by numerous streams mostly tributaries of the Blue Nile. The capital is Ankober. In 1889 Menelek, king of Shoa, became ruler of all Abyssinia, which has since become a protectorate of Italy.

**Shoddy**, the fibrous substance composed of woolen rags torn fine in a machine called a "devil," and converted into cheap cloth by being mixed and spun with a certain proportion of fresh wool. The woolen rags are brought to the mill in great bundles and are thoroughly dusted. This is done by a machine very much like a grain duster. The rags are thrown into a large semicircular box in which revolves a large wheel fitted with wide paddles. The light dust is blown out at the top of the machine and the heavy dust falls out at the bottom. Then the rags are sorted, examined piece by piece, and separated into the different grades. The finer grades, such as worsteds, fine black tailor goods, etc., are thrown by themselves, and the heavier grades are kept separate. There are about forty grades to be made out of the various kinds of cloth. After being sorted, every particle of cotton is separated from them, even to the smallest bit of thread. From the sorting room the rags are taken to another part of the building and plunged into a hot bath. Sulphuric acid is added to the water which eats out all the cotton. They are then thrown into a drying machine known as a hydro-extractor, which consists of a large tub-like vessel of steel, perforated all over with holes of good size about two inches apart. It is about two feet deep, and is surrounded by an iron vessel constructed so as to catch all water which comes out of the perforations. When power is applied the machine revolves at the rate of about 1,500 revolutions a minute. The water in the rags is thus forced out of the holes by the centrifugal force; and when the rags are removed they are as dry as though they had passed through an ordinary clothes wringer. They are then taken to the drier, where steam pipes are run above them, a current of air is forced over the pipes and through the rags, emerging at the bottom of the drier. The current is controlled by a revolving fan. The drier consists of a long, box-like arrangement, the upper portion of which is filled with steam coils, the rags being thrown on wire netting and stretched across it transversely. When the rags are thoroughly dry they are run through a dust extractor. This is practically the same as the dust extractor used in the beginning of the process, except that the dusting is more violent, and is designed to remove every particle of dust, cotton thread, small patches, in short, all substances other than pure wool. The rags are then sent to the dye room. Only the principal colors are used, blues, blacks, browns, and the like. After being boiled the requisite time in the color vats, they are again passed through the hydro-extractor and are

## Shoes

then ready to be torn into the original wool. Before being shredded the rags are mixed so as to form the shade desired in the shoddy. They are spread on the floor and mixed, and then wet with ordinary wood oil which is thoroughly shaken and applied with a hand sprinkler. The rags are then taken to the rag picker, a machine consisting of a cylinder revolving in a circular box. They are fed into it by means of fluted rollers held in place by weights. On the cylinder are 11,000 steel pins so arranged that as they catch the rags the latter are shredded. The threads are pulled apart, and when separated even they too are separated into the woolen hairs which compose them. The rag picker also separates the good wool from the bad, throwing the latter out at the top, and passing the former out at a point below the feeding place. The carding machines then comb the wool more thoroughly until it is of a uniform shade and in the shape of long, fluffy rolls. It is then packed into bales under hydraulic pressure and is ready to be shipped.

**Shoes**, coverings for the feet, generally made of leather in America and Europe, but in Holland and France often of wood, and in China and Japan of paper and other fabrics. The shoe is a combination of the sandal of the Oriental races and the moccasin of untanned hide of savage races—sole without upper and upper without sole. Shoes proper, as well as sandals, seem to have been used among the Jews; for on the black obelisk from Nimroud, Jews are represented as wearing shoes or boots with turned-up toes, similar to those worn by Orientals in the present day. The Romans used various kinds of shoes, such as the *solea* or sandal; the *calceus*, which covered the whole foot, somewhat like our shoes, and was tied with a latchet or lace; and the *caliga*, a very strong kind of shoe, sometimes shod with nails, and made to curl in the form of a ram's horn; worn by the soldiers, who were thence called *caligati*. Both in ancient and in modern times the fashion of shoes has varied much, just as in other articles of dress. In the reigns of Henry I and Stephen, shoes were made for the fashionables with long points stuffed with tow, and made to curl in the form of a ram's horn; and in the reign of Richard II the points had increased to such an extent that they reached the knee, to which they were secured by chains of silver or gold. In the eighteenth century, among the ladies, absurdly high-heeled shoes were the rage, a fashion which has been revived within the last few years. The present simple form of shoe was adopted in the early part of the seventeenth century, and somewhat later the shoe buckle came into use. In the early part of the nineteenth century buckles appear to have become unfashionable, their place being supplied by the simpler and less costly shoe strings. To the same period belongs another improvement, that of making shoes right and left. Boots are a variety of shoe with the upper leathers lengthened so as to protect part of the leg. Till recently the making of boots and shoes was a purely manual handicraft; now, with the exception of

## Shorthand

the finest and best finished qualities, the manufacture is done almost entirely by machinery.

**Sholapur'**, chief town of Sholapur District, Bombay Presidency, India, 150 mi. by rail from Poona. Its chief industry is the manufacture of silk and cotton cloth. Pop. (including cantonment) 61,281. The district of Sholapur has an area of 4,521 sq. mi., and pop. 582,487.

**Shoreditch**, a parish and parliamentary borough of Middlesex, in the east of London. It was made a parliamentary borough in 1885, with two divisions—Hoxton and Haggerstone—one member for each division. Area 648 acres; pop. 124,009.

**Shorthand**, the method of writing by which the process is so abbreviated as to keep pace with speech. It is also known, according to the principle underlying the particular system, as tachygraphy (quick writing), brachygraphy (short writing), stenography (compressed writing), and phonography (sound writing). It was practised by the ancient Greeks and Romans, not only on account of its brevity but for purposes of secrecy; but all knowledge of the art was lost from the tenth century until the end of the sixteenth, when modern shorthand had its birth in the publication by Dr. Timothy Bright of his *Characterie* (1587), and by Peter Bales of his *Arte of Brachygraphie* (1590). In these early systems arbitrary signs were used in most cases to denote each word. The earliest system of shorthand of any practical importance was that of John Willis, whose *Arte of Stenographie* (1602) became very popular. It was based on the common alphabet, with the addition of arbitrary signs; and this, indeed, was the character of the numerous systems which obtained until the time of Pitman. Among Willis's imitators were T. Shelton, whose system (1620) was used by Samuel Pepys, and that of Jeremiah Rich, whose system (1646) was commended by Locke. Rich's system was improved by William Mason (1672), the best shorthand writer of the seventeenth century; and Thomas Gurney published his *Brachygraphy*, founded on Mason's system, in 1753. The use of Gurney's system has been perpetuated by his descendants, who have been the official shorthand writers of the houses of Parliament since the beginning of the century. In 1767 appeared the *Universal English Shorthand* of John Byrom, an a, b, c system characterized by "simple strokes and no arbitrary characters"; and in 1780 was published an improvement of Byrom's system by William Mason. Samuel Taylor published his *Stenography* in 1786. This, which is the best of all the a, b, c systems, contributed largely to make stenography popular, and it was the system which was almost universally used until Isaac Pitman gave his *Phonography* to the world in 1837. In comparison with Gurney's system, Taylor's system possesses more easy and natural outlines, and is therefore capable of being written with a greater degree of speed. Like Byrom, Taylor discarded arbitrary characters altogether; but



## Shorthand

Harding, who re-edited his system in 1823, introduced a few.

Pitman had a number of predecessors, whose system, like his own, were strictly phonetic. These systems, however, never obtained any footing, while Pitman's almost immediately became popular, and is now used by a larger number of reporters and shorthand writers, both in Great Britain and in America, than any other. Taylor's system ranks next in point of use, and Gurney's third. Like all other phonetic systems, Pitman's rejects the ordinary orthography, and writes words according to their sounds; thus *though* becomes *tho*, *plough* becomes *plow*, and *enough* becomes *enuf*. Discarding the common alphabet, which formed the basis of the stenographic systems, it has adopted an alphabet of its own, consisting of a series of straight lines, curves, dots, etc., each representing a distinct sound. This alphabet is the basis of a highly ingenious and complex system, which aims at securing the greatest degree of brevity consistent with legibility. This end it endeavors to attain by a variety of devices, forming integral parts of the system. In rapid writing on Pitman's system the vowels are generally omitted.

In recent years several new systems have been introduced and have met with more or less success. Many of these are modifications of the original Pitmanic system, such as Graham's (1858) and Munson's (1867). There are also many constructed upon a new, and so-called "rational" basis. Of these now widely used in the U. S., the best known are the *Cross* or *Eclectic*, the *Fernin*, the *Gregg*, and the *McKee*. All differ from each other as greatly as from the Pitmanic systems. The first of those mentioned is formed largely upon the basis of position of strokes, though several new strokes are also used. The *Fernin* is evolved from geometrical figures and does not use the Pitmanic shading. The *Gregg* system, which has been gaining adherents rapidly in the West, has five striking features: (1) No shading; (2) Slope same as in long-hand; (3) No positions; (4) Vowels and consonants conjoined; (5) Curves are used and few angles. The *McKee*, among the latest of the prominent systems, and commonly known as the *New Standard* system, retains the Pitmanic shading, and its vowels are composed of circles and ellipses in different sizes. It does not use positions.

At the present time (1904) there are about 200 complete and more or less distinct systems in America, while in all foreign countries systems have grown up, adapted in phonetic properties or in script style to the sounds or characters of the particular language. It is interesting to note that the Pitmanic system has been adapted to Spanish, French, German, Italian, Dutch, Welsh, Japanese, Chinese and Hindustanee uses. It also retains its lead in America, both in the number of its adherents and in the number of schools in which it is taught.

Shorthand has now been developed to the point where it easily keeps pace with speech,

## Shrapnel

a fair average for an accomplished reporter being from 150 to 175 words a minute. Speed records have been made and authenticated of from 200 to 275 words a minute for a period of ten or fifteen minutes in succession, and much higher rates have been reached for shorter periods.

**Shoshone Falls** (sho-sho-nē'), on Lewis or Snake River, in Idaho. They rank among the waterfalls of North America next to those of Niagara in grandeur, being about 250 yds. wide and 200 ft. high.

**Shoshones** (or Snakes), a tribe of North American Indians inhabiting a considerable stretch of territory in Idaho, Utah, Nevada, etc. They live partly by hunting and fishing, many of them also on roots and small animals. They are estimated to number about 5,000.

**Shoshong'**, a town in the British protectorate of Bechuanaland, South Africa, about 400 mi. n. of Kimberley, with which it is connected by road and telegraph. It is the gateway between Southern and Central Africa, the three great routes from Griqualand West, the Orange Free State, and the Transvaal meeting here, and again branching off north to the Zambezi, northeast to the Matabele country, and northwest to Damaraland. There is a station of the London Missionary Society at Shoshong, which has a pop. est. at from 15,000 to 30,000.

**Shot**, a term applied to all solid projectiles fired from cannon, and also to hollow projectiles without bursting charges, as the Palliser shot. Solid shot have gradually disappeared since the introduction of rifled guns, which fire elongated shot with more or less conical heads. Some of the shot fired by the immense guns now used weigh not less than a ton. Smooth-bored ordnance still use solid round shot and case shot. Case shot consists of iron balls packed in iron or tin cylindrical cases. Grape differs only in the balls being larger. Shot is also the name given to the small round pellets of lead used with sporting guns for shooting small quadrupeds and birds. This kind of shot is made by dropping the melted lead through the holes of a colander set at a considerable height above water, the drops naturally assuming the globular form.

**Shovel Fish**, a genus of fishes belonging to the sturgeon family, and found in North American rivers. It is so named from the flattened form of the head.

**Shoveler Duck**, a genus of Anatidæ or ducks, distinguished by its long bill, of which the tip is hooked and broadened. The average length of this bird is about 18 or 20 in. In the male the colors are rather gay and varied—green, white, brown, pale blue, and black. The coloring of the female is more somber. The shoveler duck is found in North America and Europe.

**Shrapnel**, LIEUTENANT GENERAL HENRY (d. 1842), entered the Royal Artillery in 1779, served with the Duke of York's army in Flanders, and shortly after the siege of Dunkirk invented the case shot known by the name of shrapnel shells, an invention for which he received from the British government a

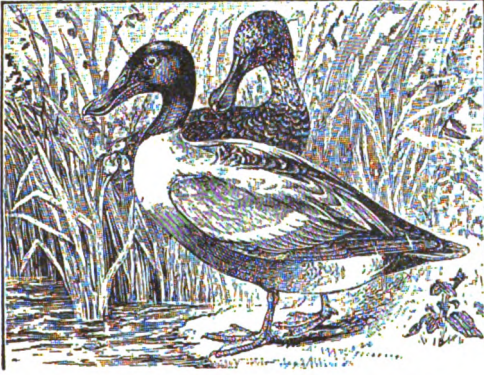


## Shreveport

pension of \$6,000 a year in addition to his pay in the army. He retired from active service in 1825, attained the rank of lieutenant general in 1827.

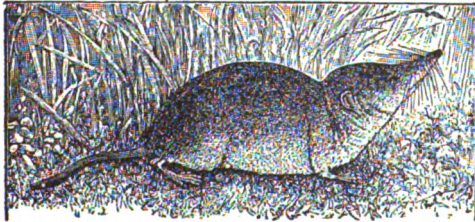
**Shreveport**, Caddo co., La., on Red River, 301 mi. n.w. of Baton Rouge. Railroads: St. L. A. & T.; and Texas & Pacific. Industries include machine shops, cotton seed oil and lumber mills, etc. Exports cotton and cattle. Pop. 1900, 16,013.

**Shrew** (or Shrew Mouse), a genus of mammals, to be carefully distinguished from the



The Common Shoveler; male and female.

ordinary and common mice, and from the dormice. The common shrew averages about 4 in. in length, the square tail making up half of this measurement. It may readily be distinguished by its prolonged muzzle, by the teeth being colored brown at the tips, and by the reddish-brown fur. It feeds upon insects and their larvæ, and inhabits dry places, making a nest of leaves and grasses. Its habits are chiefly nocturnal. Shrews are very voracious in their habits, and frequently kill and devour one another. They secrete a fluid of disagreeable odor in special glands, and this odor prevents larger animals from eating their flesh. In former days the bite of the shrew was accounted venomous, while its body, variously



The Common Shrew.

treated, was regarded as a cure for many complaints. The water shrew attains a total length of from 4½ to 5 in. The snout is not so pointed as that of the common shrew. The ears are very small. The color is black on the upper and white on the under parts. A prominent swimming fringe of stiff, white hairs is found

## Shrike

on the tail and on the toes, and forms a distinctive feature of the species. Its food resembles that of the common shrew, but aquatic larvæ appear to form a large part of its nutriment. It makes its burrows in the overhanging banks of rivers and lakes, and dives and swims with great facility. The red-toothed shrews characteristic of the North American continent belong to the genus distinguished by the dentition and the remarkable shortness of the tail.

**Shrew Mole**, a genus of mammals belonging to the family of shrew mice, but also by some zoölogists placed in the mole family. It is found in North America, usually near rivers and streams, and burrows after the fashion of the common mole, like which, also, its fur is fine and closely set. The average length is about 7 in.

**Shrewsbury**, a municipal and parliamentary borough of England, capital of Shropshire, 42 mi. n.w. of Birmingham. The chief manufactures are glass staining, the spinning of flax and linen yarn, iron founding, brewing, and the preparation of brawn. In 1403 the famous battle which resulted in the defeat of Hotspur and the Earl of Douglas, his ally, by Henry IV. was fought in the vicinity. Pop. 26,967.

**Shrike**, a general name applied to the members of a family of insectivorous birds. The family is conveniently divided into two groups, the true shrikes, and the bush shrikes. The genus of true shrikes is distinguished by the broad base of the bill, which is hooked at the



Great Gray Shrike.

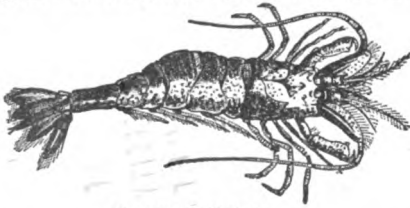
tip. The nostrils, which are situated laterally, are surrounded by bristles. The fourth quill is longest in the wings, and the tail is of graduated or conical shape. The great northern shrike of North America imitates the sounds of other birds. This species is colored gray on the upper and white on the under parts; the quills of the tail being black with white tips, while a band of black crosses the forehead, surrounds the eyes, and terminates at the ear covers. The average length is about 9 or 10 in. The food consists of mice, shrew mice, small birds, frogs, and insects; and these birds have the habit of impaling their prey on



## Shrimp

thorns or suspending it on the branches of trees, in order to tear it to pieces with greater ease, a habit which has obtained for them the name of butcher birds. In the tree shrikes, the bill is long and possesses an arched keel, the tip being hooked and bristles existing at the base. Some of the species attain a length of from 12 to 13 in. They are common in South America. The name of drongos or drongo shrikes has been given to certain birds allied to the shrikes, and forming the family *Dicrurinae*. The loggerhead shrike inhabits the Gulf states; the white rumped and white winged are inhabitants of Western North America.

**Shrimp**, a genus of small crustaceans, closely allied to the crawfish. The "common shrimp" is found in the North Atlantic Ocean, on both English and American coasts, and also in the



Common Shrimp.

Pacific. It is about two inches long, greenish-gray in color, with brown dots. When boiled the shrimp becomes a dark brown or bright red. It is used for food; the annual value of the industry in the U. S. is nearly \$1,000,000.

**Shropshire** (or Salop), an inland county of England. Area 844,565 acres, of which about seven-eighths are under crop. The principal mineral products are iron, coal, lead, limestone, and freestone. The coal fields are extensive and productive. The soil is various, but generally fertile and well cultivated, although there are extensive tracts of waste land. The principal crops are wheat, barley, oats, peas, vetches, turnips, potatoes, and beans. In the south and west cattle breeding and dairy farming are carried on. The county is famous for its breed of sheep. A good deal of cheese is made, and large flocks of turkeys are raised. The manufactures include that of iron to a very great extent, chinaware, carpets, gloves, and flannel. Pop. 236,324.

**Shrouds**, a range of large ropes extended from the heads of the lower masts to both sides of the ships to support the masts, and named from the masts to which they belong, the main, fore, and mizzen shrouds. Topmast, topgallant, and bowsprit shrouds are all similar in their object.

**Shrove Tuesday**, the day before the first day of Lent, or Ash-Wednesday, so called as a day on which confession was specially made, and "shrift" received. It was a day of considerable festivity, and from the common practice of eating pancakes on the day, the name to be called *Pancake Tuesday*.

**Shumla**, a fortified town of Bulgaria, 50 mi. w. of Varna. Enclosed on the north and west by hills which form a natural rampart, strongly

## Siam

fortified, and with roads leading northward to Rustchuk and Silistria, southward to the passes of the Balkans, and eastward to Varna. Shumla is one of the most important military positions in the Balkan Peninsula. Pop. 23,161.

**Shusha**, a town of Asiatic Russia, in Transcaucasia, in the government of Elisabethpol, 230 mi. s.e. of Tiflis, on an isolated rocky eminence nearly 4,000 ft. high. Shusha was formerly a fortress, and the capital of the khanate of Karabagh, annexed to Russia in 1822. Pop. 24,552.

**Shuster**, a town of Persia, in the province of Khuzistan, on the Karun, 170 mi. w. by s. of Ispahan. Once a flourishing provincial capital of Persia, it is now rising into importance again owing to its position on the Karun. Pop. 27,000.

**Siam**, a kingdom embracing a great part of the Indo-Chinese Peninsula and part of the Malay Peninsula, and lying between Burmah on the west, and Anam and Cambodia on the east and southeast. Its boundaries are ill-defined on the north and northeast, but its area is estimated at 244,000 sq. mi., and its population at 7,000,000, including 2,500,000 Siamese, 2,000,000 Laotians, 1,000,000 Chinese, and 1,000,000 Malays. A large part of the territory is not well known. Siam proper consists mainly of the low-lying alluvial basin of the Menam and its numerous tributaries, which flows southward into the Gulf of Siam, forming an extensive and intricate delta, on which is situated Bangkok, the capital. This alluvial plain, intersected by numerous streams and canals, is extremely fertile, producing magnificent crops of rice, sugar, cotton, maize, and indigo. Both sides of the Menam basin are skirted by densely-wooded ranges of hills, forming the water partings toward the Salwin and Mekong, the latter of which is the great river of Eastern Siam. The minerals include gold, tin, iron, copper, lead, zinc, and antimony, besides several precious stones, such as the sapphire, Oriental ruby, and Oriental topaz. Mining is chiefly in the hands of the Chinese. Much of Upper Siam seems incapable of being cultivated. During the dry season, which lasts from November to May, there is an utter absence of rain in this region, which again is so flooded by rain during the wet season as to be converted into a vast swampy forest. Cocoa and areca palms are numerous in Siam; fruits are abundant and of excellent quality; black pepper, tobacco, cardamoms, and gamboge are important products. The forests produce aloes wood, sappan wood, teak timber, bamboos, rattans, gutta-percha, dammar, catechu, benzoin, etc. Among wild animals are the tiger, leopard, bear, otter, orang-outang, single-horned rhinoceros, and elephant, which here attains a size and beauty elsewhere unknown. The last, when of a white color, is held in the highest reverence. The forests abound with peacocks, pheasants, and pigeons, and in the islands are large flocks of the swallows that produce the famed edible birds' nests. Crocodiles, geckoes, and other kinds of lizards, tor-



